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ELECTRIC RAILWAY TRACTION

A Supplement illustrating and describing developments in Electric Railway Traction is presented with each copy of this week's issue.

A Waterloo Waiting Room

ON the down local platform of that part of Waterloo station better known as Waterloo Junction, a waiting room has been opened. It is a great improvement on the old type of such rooms. This one has a green dado on the walls and a light yellow upper part, with a green band; the architraves to the windows and the doors are in a darker shade of green. Wood blocks form the floor. At each end of the room is an electric heating stove, set against a stone surround. Box-form electric light fittings are fixed tight up to the white ceiling. The Southern Railway has gone gently modern in this waiting room, for the windows have horizontal glazing bars and the door grips are set slightly staggered. Coloured pictures of Dieppe, Deal, Bude, and Bournemouth adorn the walls. But there may be passengers who prefer the old fashions and can't abide the new; for them the company has catered by furnishing the room with two dark brown framed and dark brown leather upholstered benches, and two ditto chairs. On a recent very cold morning the fires were found to give out a comfortable heat—*quantum mutatus ab illo.*

Twelve Months of "On Time"

Mr. C. R. Byrom, Chief Operating Manager, L.M.S.R., reviews the results for the first year of the company's punctuality league in the February issue of *On Time*, the journal of the Operating Department. The close finish of the express train competition, in which the Central Division won first place from the Northern by a margin of only 58 points on the whole year, is typical of the keenness with which the contest has been pursued right into its ultimate stages. Local trains have finished the year with results that are equally encouraging for the future. Four districts earn promotion from League II to League I, and nine come up from League III to League II. The original allocation of the fifty-one local divisions in England and Wales into their respective leagues was made according to their standard of punctuality over a given period, so that in this case promotion means the attainment of a new level of time-keeping, and is conclusive proof of the value of the "On Time" system. Only two districts have failed to maintain the standard required of them, both being in League I and suffering relegation to League II. The London District headed the table in this competition, which is for local steam passenger trains, but finished fifth in the electric league. The Wirral steam service is at present included in the latter group, and finished third.

* * * *

The Week's Traffics

The latest traffic returns of the four group companies are for the week ended Sunday night, February 2, in the case of the L.M.S., Great Western, and Southern Railways, and last Saturday night in the case of the L.N.E.R. They thus include much of the passenger movement in connection with national mourning, which also accounts for the decreases in general merchandise shown by three of the companies. Coal traffics again make the best display, and for the five weeks of the current year give an increase of £283,000, or 8·61 per cent. Passenger train receipts of the four companies for the same period have advanced by £60,000, and general merchandise earnings show a net improvement of £42,000. Taken together the traffics of the four companies to date are £13,416,000, an increase of £385,000, or 2·95 per cent.

	5th Week				Year to date	
	Pass., &c.	Goods, &c.	Coal, &c.	Total	Inc. or Dec.	
	£	£	£	£	£	%
L.M.S.R. ..	+ 2,000	− 3,000	+ 18,000	+ 17,000	+ 159,000	+ 3·03
L.N.E.R. ..	+ 1,000	+ 9,000	+ 30,000	+ 40,000	+ 139,000	+ 3·53
G.W.R... ..	+ 6,900	− 5,000	+ 7,000	+ 8,000	+ 52,000	+ 2·36
S.R.	+ 15,000	− 1,000	+ 5,000	+ 19,000	+ 35,000	+ 2·14

London Transport receipts for the past week show an increase of £41,400, the largest since the £110,800 of Jubilee week.

* * * *

Sledging Parliamentary Plans

The recent seasonal vagaries of the weather, coincident with introduction of new private bills to Parliament, recall the peculiar circumstances which attended the promotion of the Lancashire, Derbyshire and East Coast Railway in 1891. The scheme, which was among the most ambitious since those of the forties, involved the construction of 172 miles of railway across country from Warrington to Sutton-on-Sea in Lincolnshire, the route being by way of Knutsford, Macclesfield, Buxton, Chesterfield, and Lincoln. When the time came for depositing the plans severe snow storms were enveloping the Peak District; the roads in Derbyshire and the Dukeries were almost impassable. As time grew short the problem arose as to how the mass of plans and documents were to be deposited in the various parishes through which the proposed railway would pass. The difficulty was met in a

dramatic manner by the late Mr. Dixon Davies, the Solicitor, who was later to become Solicitor of the Great Central Railway. He immediately ordered forty wooden sledges to be built, and on these the plans of the Lancashire, Derbyshire and East Coast Railway were taken on their journeys. Parliament sanctioned the scheme, but eventually only a short section between Arkwright Town, near Chesterfield, and Pyewipe Junction, near Lincoln, was completed. This was absorbed by the Great Central on January 1, 1907.

* * * *

Proposed Revision of Etat Timetables

M. Direz, Operating Manager of the French State Railways, has communicated to our contemporary, *Transports*, the principles upon which he proposes to reorganise the timetables to give uniform as well as better services. The potentialities of railcars in providing faster and more frequent services are to be turned to good account, for the reduced line occupation following their use in place of steam trains on main-line stopping journeys would increase the number of paths available for expresses. As to speed, M. Direz proposes four 74-m.p.h. non-stop runs each way daily between Paris and Le Havre by railcars with first and second class accommodation. There would also be five steam trains (all classes) each way, to call at Rouen, Yvetot, and Bréauté only, with an average speed including stops of 62 m.p.h. Eight fast trains in each direction, leaving at two-hour intervals and making five intermediate halts, would run between Paris and Rouen, and would have connections by railcar at Mantes with all points between there and Rouen. An hourly railcar service to and from Rouen would serve all points on the Rouen-Le Havre section. For the Cherbourg line, M. Direz proposes five up and five down expresses to make the Paris-Caen journey with three stops in 2 hr. 58 min. Three of these trains each way might be extended to serve Cherbourg in 5 hr.

* * * *

Tasmanian Government Railways

An increase of £8,861 in gross earnings following an increase of £9,420 for the previous year is a gratifying feature of the report on the Government Railways of Tasmania by Mr. F. P. S. Hill, Commissioner for Railways, for the year ended June 30, 1935. Expenditure was, however, higher by £32,561, caused principally by the fact that the restoration by the Federal Arbitration Court of the 10 per cent. cut in salaries and wages was in operation for the whole of the year under review, as against two months in the previous year. Repairs were also unusually heavy, and increased mileage had to be run for the increased business. The two new Sentinel-Cammell cars put into traffic in the previous year have proved to be highly efficient, and another two cars of similar horsepower have been ordered.

	1934–35	1933–34
Average miles	645	645
Passengers	2,133,541	1,789,329
Goods and minerals, tons	656,333	539,847
Train-miles	1,233,350	1,137,477
Operating ratio, per cent.	118·06	98·59
	£	£
Passenger receipts	111,578	107,097
Goods and minerals receipts	236,857	230,596
Total earnings	399,764	390,903
Working expenses	417,944	385,383
Surplus (+) or loss (−)	− 18,180	+ 5,520

For the first time since 1929 provision is being made for depreciation, to the extent of £54,000. The increased business done has not been sufficient to offset the substantial reductions in fares and freights.

Exit the Indicateur Chaix

Few regrets will be felt, on the part of those compelled to make use of it, that the vast *Indicateur Chaix* of the French railways is about to disappear in favour of a timetable of more reasonable dimensions and greater clarity. The pattern of the new French "Bradshaw" is to be the *Horaires Mayeux*—a compilation which has been in existence only for two years past, and has earned universal approbation by the clearness of its printing and the simplicity of its arrangement. Hitherto the individual timetables of French railways have also been modelled, on *Chaix*, but they will all in future be of the *Mayeux* type. The P.L.M. made the change in October, and the Nord in November; the Est, Alsace-Lorraine, Etat, and Paris-Orleans-Midi will follow, in this order, and by the inauguration of the summer train service, in May next, the complete *Indicateur*, in its new *format*, is expected to be available, and the *Indicateur Chaix* will cease to appear. By special photographic means the same sheets as in the timetable, suitably enlarged, will be used for posting at the stations, and with only one table per service to correct, instead of three, as previously, the chances of errors will be greatly reduced. Similarly, the number of each service will be the same in the railway timetable, the railway station sheets, and the general *Indicateur*, so simplifying for the public the hunt for trains. The reduced cost of timetable printing to the railways is another material advantage which will result from this excellent scheme of unification.

* * * *

The Sydney Limited

Notwithstanding the fact that a cut of 75 min. has recently been made, jointly by the railways of Victoria and New South Wales, in the timing of the Sydney Limited Express service between Melbourne and Sydney, some considerably more revolutionary changes are planned for this year. The distance of 591 miles separating the two capitals is at present spanned in 15 hr. 20 min., which with the rolling stock now in use requires hard locomotive work, in view of the heavy intermediate grades. The fastest running is made on the Victorian side of the interstate border, and includes a non-stop run over the 129½ miles between Albury and Seymour—the longest in Australia—which in the westbound direction, notwithstanding a large proportion of single line, is booked to be covered at an average speed of 50·5 m.p.h. But the intention is to cut the Sydney-Melbourne time in 1936 by over three hours, to 12 hr. For this purpose an entirely new train is being built by the Victorian Railways, in which, by the use of welded construction and alloy steels, a considerable reduction in weight will be effected, and its introduction will set new standards of both speed and comfort on the Australian continent. Air-conditioning will form part of the new facilities. Similar developments will take place in New South Wales, for it has to be remembered that the break of gauge at Albury precludes the running of through trains from Melbourne to Sydney.

* * * *

Rail and Road in Brazil

The view that railways are obsolete and should be converted into motorways is still expressed from time to time, and our contemporary, *Brazil-Ferro-Carril*, reports a newspaper agitation in the State of São Paulo for a cessation of railway building in Brazil and the extinction of that system of transport in favour of motorcars and lorries. The argument, which was supported by no scientific facts, was very general, and displayed a lack of appreciation of the economic side of the problem. The

importance of good roads, says our contemporary, is undeniable, but to suggest that the bulk transport of wood, cotton, coffee, &c., by lorries could be as cheap as by train is manifestly absurd. Even the highest rail costs per tonne-km. now ruling in São Paulo cannot be worked to by motors, and still less can the road transport concerns pay a return on the initial capital cost of the highways that such traffic would require. Our contemporary quotes, with approval, the editorial in our issue of April 19, wherein we pointed out how the intensification of road traffic was compelling the adoption of safety measures comparable with those required on railways, with the result that some of the hoped-for advantages of the road were becoming illusory, and concludes by saying that to substitute *autobahnen* for the Brazilian railway system, even if practicable, would make the country dependent for transport on imported fuel, a most undesirable result for military reasons.

* * * *

Chinese Organisation for Heavy Construction

On page 249 of this issue we publish an article describing the construction works at present in hand on the Canton-Hankow Railway in China. It is significant that, in spite of the difficult country encountered in the 252 miles of this line which are being constructed as the middle and remaining link in the Canton-Wuchow (Hankow) chain, the work is entirely under the supervision of Chinese engineers. In this connection our editorial on page 706 in the issue of November 1 last is not quite correct, as, though Messrs. Sandberg are Consulting Engineers for the inspection of material purchased in Europe for this line, they are, we now understand, not responsible for the supervision of the engineering works in China, of which Mr. Ling and his assistants are in sole charge. One of their greatest difficulties, as so often happens on construction works in mountainous country, was transport. But it is evident that the arrangements made in this, as in other directions, have proved equal to all requirements, and that the organisation generally has been such as to secure expeditious and, so far as one can judge, economical work. The real test of the latter will, however, be the cost of maintenance during the next ten years, though with the good limestone encountered, there should be little fear on this account. The Ministry of Railways at Nanking and the engineers on the spot deserve congratulations on the success of their achievement.

* * * *

Cramping the Manufacturer

Certain points of considerable importance were made by Mr. Vernon Harbord in the paper which he read recently before the Institution of Locomotive Engineers on " Metals and Alloys in Locomotive Construction." It was that " the ideal specification will only insist on such conditions as can be definitely ensured by reasonable inspection." He went on further to claim that " reasonable latitude must be given in all specifications, and if engineers are to benefit from the experience of the manufacturers, too much detail should not be specified." From year to year the tendency has been progressively to expand, by the inclusion of more and more detail, the provisions of standard specifications, while at the same time reducing their latitude to correspondingly narrower dimensions. It would be difficult to prove that the result has been proportionately to improve the finished product. On the contrary, as the author claims, ultra-rigid specifications tend to set up a feeling of distrust between the user and the manufacturer; the inclusion of provisions the observation of which the inspector has no means of checking weakens the specification from his point of view, and is likely to divert the attention of the contractors from matters of major importance; and above all, such specifications cramp any initiative that might be displayed by the manufacturer towards the supply of a superior article.

* * * *

Experimental Crank Axles for Locomotives

The crank axle has always been regarded, more particularly in certain countries abroad, as a feature of locomotive construction that it is desirable to avoid. On British railways, however, mainly owing to the preponderance in former years of inside-cylinder engines, the crank axle has not been viewed with such suspicion. The subject cropped up, in the paper read at a meeting of the Institution of Locomotive Engineers in London by Mr. E. S. Cox, who, speaking on " Experimental Crank Axles," stated that if built-up cranks never shifted they would stand out as almost perfect objects in an imperfect world. This thought, said Mr. Cox, had given rise to a number of fresh lines of investigation, and one or two of the efforts made to provide improved forms of crank axle were deserving of attention. In a paper read by Mr. G. N. Shawcross an axle was described in which the outer shafts and webs were forged in one piece, and the rest built up in the ordinary way, making what might be called a semi-built-up type. This design was based on observations showing that practically 50 per cent. of the total failures occurred between the axlebox journal and the outside webs. At various times nine such cranks of the two-throw type had been put into service, and to date the average mileage was 228,821. Only one of the nine axles had required repairs, on which occasion the left-hand crank pin was found to be loose in the outer web. Under the conditions imposed, and bearing in mind that the engines fitted with these cranks operate over a difficult road, the results so far may be regarded as satisfactory. The cost of such a crank comes about halfway between that of the solid and built-up types.

* * * *

N.S.W. Locomotives and Rolling Stock

The latest report of the New South Wales Commissioner for Railways refers to the activities of the locomotive department and the various locomotive and rolling stock workshops in the year ended June 30, 1935. During the last two years a large number of goods locomotive boilers have been standardised, and it is intended to equip 433 goods engines with this improved type of interchangeable boiler. It is further emphasised that the new boilers, in addition to representing a great improvement on the old type, cost less to make. Tests have proved them to be economical in coal and water consumption, and more efficient under steam. Twenty-seven passenger engines and thirty goods tender engines were rebuilt and fitted with new boilers during the same period, whilst sixty-two locomotive boilers were constructed. The overhaul of existing boilers was carried out on a fairly extensive scale—a total of 320 in the workshops and 416 at the running depots—whilst heavy repairs were carried out on a total of 235 boilers. The railway shops converted 44 suburban carriages to tourist type vehicles, 8 old type and 20 side-door carriages to corridor cars, and 6 old type corridor carriages to similar vehicles but of a new type. A kitchen car and attendants' car were converted into corridor vehicles for a two-car unit, and one corridor carriage was converted to a dining car. Heavy repairs were effected on 2,891 wagons and vans. During the year 1,131 four-wheeled steel wagons were converted from new standard to automatic drawgear.

New South Wales Government Railways

VERY satisfactory results were obtained from the operation of the New South Wales Government Railways for the year ended June 30, 1935, as shown in the report by Mr. T. J. Hartigan, Commissioner for Railways, which has recently reached us. Total earnings increased by £1,112,513 or 7·47 per cent., whereas in working expenses there was an increase of only £362,138 or 3·23 per cent., so that net receipts from operation improved by £750,375 or 16·93 per cent., giving a return on capital of £3 2s. 9d. per cent., compared with £2 12s. 4d. per cent. for the previous year. The Government contributed £800,000 towards loss on working country developmental lines, but heavy statutory charges had again to be met, and the final result is a deficit of £1,283,511, which, however, is £1,304,616 less than that for the previous year. Of the deficit £802,930 represents exchange payments. Earnings from first and second class travel increased by £66,862 and £188,968 respectively, and from workmen's tickets by £28,131, over the previous year, and the total of passenger journeys exceeded the previous record of the year 1928-29 by 9,095,422. Parcels, &c., brought in £28,569 more, and the revenue from goods traffic, including live-stock, improved by £770,987. Of the increase in working expenses an amount of £211,000 was due to increases in wages under Federal and State awards. The operating ratio is the lowest since 1925.

Some comparative figures are given in the accompanying table:—

	1934-35	1933-34
Miles open	6,163¾	6,163¾
Train-miles	26,275,459	25,173,199
Passengers	160,211,508	142,520,429
Goods and coal, tons	12,323,693	10,643,139
Operating ratio, per cent.	72·27	75·24
	£	£
Passenger receipts	5,153,196	4,869,235
Goods and coal receipts	7,541,577	6,784,353
Total earnings	16,002,699	14,890,186
Working expenses	11,565,658	11,203,520
Net earnings	4,437,041	3,686,666

Slow mixed trains on three branches have been superseded by fast passenger trains run with re-conditioned light type engines. Improved timing of the limited and ordinary express trains between Sydney and Melbourne reduced the journey time between these cities by 75 minutes in each direction, and the schedule of the Sydney-Broken Hill express trains was improved to the extent of 90 minutes. Faster schedules for goods trains have been introduced on many lines. A daily fruit train, run at mail train speed, has been inaugurated between Griffith and Sydney to handle the output from the irrigation area, and the fruit train service from the North Coast line has been expedited to ensure arrival in time for the early morning markets. A high standard of punctuality was maintained in the running of all express trains during the year. In the case of the Sydney-Melbourne express trains, on the 400-mile journey from Sydney to Albury 96·45 per cent. of trains arrived on time, or not more than 10 minutes late, and between Albury and Sydney the corresponding percentage was 96·02. During a period of six months 24 of the Class 36 locomotives ran a total of 683,388 miles without a delay of more than five minutes to the trains concerned.

In connection with the three-year financial plan, under which the Government is advancing £3,300,000 free of interest for bringing rolling stock and track to a high state of efficiency, the sum of £860,000 was spent in the year under review on reconditioning the track. It is proposed to spend a further sum of £1,250,000 in the year 1935-36. Four diesel trains will be placed in service on country lines. Each train will consist of one motor car (driven by two diesel engines) and three trailer cars. It is claimed that these trailer cars will be the first railway rolling stock in Australia to be completely air-conditioned. To meet the increasing goods business, and to derive the fullest benefit from the D57 goods locomotives, it has been found desirable to run goods trains of substantially heavier loading. During the year exhaustive braking tests were conducted on the severe mountain grades between Katoomba and Penrith. A train loaded with 2,000 tons of coal and other merchandise was taken down the mountains as a test of the Westinghouse grade control valve system. The maximum loading permitted on these grades is 1,100 tons.

* * * *

Railway Cash-on-Delivery Service

THE cash-on-delivery facility has become a well established practice in commercial life, and the railway companies are doing a steadily increasing business in the conveyance of such consignments. Facilities were first afforded the public for the despatch of parcels under this system by the General Post Office in March, 1926, and the innovation proved an immediate success, although it applied only to parcels under 11 lb. in weight, of the usual Post Office dimensions, and not exceeding £40 in value. Representations were soon made by traders that the scheme should be extended to cover the despatch of larger, heavier and more valuable parcels and, accordingly, in April, 1928, the railway companies entered into an arrangement with the Postmaster General whereby the postal cash-on-delivery system was extended to apply to packages conveyed by goods or passenger train, the companies charging 3d. per consignment over and above the appropriate carriage charges, and in addition to the Post Office fees. It was found essential to introduce a slightly more complicated procedure because of the dual control, and the combination of additional cost and complexity resulted in the arrangement being utilised by traders only to a comparatively small extent. Representations were then received from the trading community that the railway companies should introduce their own cash-on-delivery arrangements and, accordingly, the companies brought their own scheme into operation experimentally on July 1, 1934, for traffic by goods and passenger train services, irrespective of weight or size, but restricted to a value not exceeding £40 per consignment.

This arrangement was applicable between all points in Great Britain and with certain Continental ports, and applied to all traffic carried under the appropriate standard terms and conditions, with the exception of wet fish and ice, highly perishable traffic to or from Continental ports, livestock, and certain dangerous goods. Traders were quick to take advantage of the facility, and at the end of August, 1934, the scheme was extended to similar traffic conveyed throughout by railway-operated road services. As over 150,000 cash-on-delivery consignments were forwarded during the first twelve months of the scheme, the companies decided to continue the facility permanently, but with the limitation of value extended to £100 as from January 1, 1936, to meet the requirements of certain traders. The commission fees payable range from 6d. where the value of the consignment does not exceed 10s. to 2s. for values between £25 and £40, and 5s. for values between £90 and £100. Arrangements can be made for these commission payments to be charged against the accounts of those traders who have authorised credit

accounts, and the steady increase in the number of consignments despatched under this system is evidence that the facility is of considerable value to traders and the public.

* * * *

Railways and the Sugar Beet Industry

ONE of the most prominent features of British Agriculture in recent years has been the remarkable increase in the cultivation of sugar beet, an industry with which the railway companies have been very closely associated since its commencement. The extent to which this industry has now developed can be gauged from the fact that during last season over 1,700 stations, covering almost every county in England, Wales and Scotland, loaded sugar beet, the total quantity conveyed by rail exceeding two million tons. In addition to conveying this large tonnage by rail, the railways hauled about 250,000 tons by road from the farms to the railway stations. The growth of the industry has, of course, been largely assisted by Government subsidies, and factories have been set up in geographical relation to the growing areas, the basis of the scheme being that farmers in a particular locality enter into contracts with the appropriate factory to plant a certain acreage with sugar beet. The extension of sugar beet growing practically throughout the country created an entirely new transport problem, as the factories have to deal with the whole of the beet in the comparatively short time of about seventeen weeks. Harvesting the crop begins about the middle of September, and the closest co-operation was soon found to be essential between growers, railways, and factories in order satisfactorily to accomplish the difficult task of transporting such a heavy tonnage in so short a period. After starting operations, the beet sugar factories continue working day and night until the whole of the crop has been dealt with, which is generally about the middle of January.

Soon after sugar beet farming was started on a fairly wide scale, arrangements were made to control the flow of the traffic so as to ensure a continuous supply of beet to the works, and at the same time to prevent any congestion and consequent loss of wagon user *en route* or at the destinations, an important feature when so many wagons are involved. With the co-operation of the factory authorities, a scheme known as the " permit " system was introduced by the railway companies some years ago, and proved so successful that it has now been adopted throughout the country. Under this arrangement the factories estimate at the beginning of each season the tonnage of sugar beet likely to be supplied by each grower with whom they have a contract. Permits, numbered to correspond with the weeks of the factory season, are then issued to the growers authorising them to load a specific number of wagons each week in such a manner as will ensure, as far as practicable, a steady and continuous supply of the beet at the various works throughout the season. In addition, a series of lettered permits is issued to the growers, and if for any reason a factory becomes short of supplies, the farmers in that area are authorised to make use of the lettered permits to the extent necessary for supplementing the loadings. Apart from the conveyance of the sugar beet, the railways also carry over 750,000 tons of lime, limestone, coal, coke, &c., to the factories, while the quantity of sugar despatched approximates 600,000 tons. Very favourable rates are quoted for conveyance of the beet, and for its cartage from the farms, and there can be no doubt that the railway companies have contributed materially to the growth of this important development in British agriculture.

33,600 lb. Tractive Effort on 45-lb. Rails

ON pages 243-248 of this issue we describe and illustrate a new design of Beyer-Garratt locomotive built for service on the 45-lb. rail section of the 3 ft. 6 in. gauge Nigerian Railway. These new engines, while conspicuous as an example of modern and carefully considered locomotive practice, are of special interest owing to the peculiar conditions under which they will have to work. At the instigation of Mr. G. V. O. Bulkeley, General Manager of the Nigerian Railway, an exhaustive investigation was recently made into the operating economics of an intermediate 45-lb. rail section in which numerous bridges, already overstressed, existed. A mixed traffic locomotive was required capable of handling ordinary eight-coupled engine loads from the 55-lb. and 60-lb. rail adjoining each end of the section in question, and the Garratt type was chosen as providing the only means of attaining this end, in view of the bridge restrictions and maximum axleload of only $9\frac{3}{4}$ tons.

Thus, compared with a 10-coupled design, which was found prohibitive for the bridges, there has been obtained a six-coupled engine with a rigid wheelbase of only 8 ft. $10\frac{1}{2}$ in., and a boiler of adequate power, together with generally reasonable dimensions and simplicity, and an increased diameter of coupled wheel. Such an engine will be easy on the track and curves, and capable of hauling at the speed required the load of a 60-lb. rail eight-coupled engine, the use of a multi-coupled engine with boiler and parts of maximum size being thereby avoided. These Beyer-Garratt locomotives, each weighing approximately 112 tons in working order, exert a tractive force at 85 per cent. b.p. of 33,600 lb., and the order is unique in that interesting alternatives have been specified. All the engines are designed for 225 lb. boiler pressure, the highest yet adopted in British Colonial practice, but two will be arranged for 200 lb. pressure, and have larger cylinders, while the fitting of one of each type with different draught arrangements will permit of a definite conclusion as to the " commercial " efficiency, under Nigerian conditions, of these modern features.

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Systematic Permanent Way Maintenance in India

SINCE the beginning of 1932 a scheme for the systematic maintenance of permanent way has been in operation in the North Eastern Area of the L.N.E.R. with beneficial results. The scheme, which was introduced by Mr. John Miller, was described in our issue of February 22, 1935, and we now learn that a similar scheme based upon that of Mr. Miller has been adopted by the South Indian Railway, whose District Engineer at Cannanore, Mr. H. E. Thompson, has got out a calendar of systematic maintenance and has had it translated into three local vernaculars, Tamil, Malayalam, and Canarese. The great merit of a systematic programme for the maintenance of permanent way is, of course, that it controls and guides the work of gangers or other supervisors whose initiative and organising ability are not of a high order, and at the same time it contains sufficient elasticity to avoid interfering with the individual initiative of those who can display that valuable quality. We should imagine that such a method of maintenance would show to best advantage in countries like India where the average standard of education and initiative is not high, and we look forward to being able to tell our readers in due course how it has worked out in practice on the South Indian Railway.

LETTERS TO THE EDITOR

(The Editor is not responsible for the opinions of correspondents)

Stevenson and Stephenson

Oakfield,
Oakley Street,
Shrewsbury,
February 1

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—Referring to Mr. Macdonald's very interesting letter in your issue of January 24, although not moved by zeal for meticulous accuracy, I doubt the accuracy of his statement that it was "This Stevenson of Edinburgh finding Trevithick, the father of the locomotive, stranded in South America, gave him £50 to get home with."

If Mr. Macdonald is correct, then Smiles, in his "Lives of the Engineers—George and Robert Stephenson," is wrong, as in Chapter XI he describes Robert Stephenson's journeys in South America, and how arriving at Cartagena, Stephenson met Trevithick penniless in an inn and lent him £50 to enable him to reach England.

It is remarkable how often the two names are confused, sometimes even by engineers, the confusion being in the correct rendering of the name Stephenson.

Yours truly,

HAROLD H. BIRD
Assoc.M.Inst.C.E.

Royal Funeral Music in Paddington Station

Coll-Earn, Auchterarder,
January 26

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—I suppose I am a bit musical, since I am asked to lecture and write articles on music and have known most of the cathedral organists in Great Britain for over 45 years. I say without hesitation that I have heard only two overwhelming musical effects; one was a choirs' festival (800 men) in Notre Dame Cathedral, where my friend M. Marcel Dupré handled the great organ; the other was in Paddington station.

It was Queen Victoria's funeral. All officers not on duty were ordered to stand in the Mall. We (6,000, the papers reported) walked up and down in the cold, and when the cortège came along I happened to be at the top end beside Marlborough House, and by a group of admirals. As the last carriage went past I said to them, "We cannot let the old Queen go without following her." They agreed. So, totally unauthorised, I found myself, with Admiral Baden-Powell on one side and Maclaine of Lochbuie (in a hussar uniform of the Crimea) on the other, leading the whole 6,000, clad in uniforms from all over the Empire.

And so to Paddington; no escape between close ranks of soldiers and police. I found myself on the arrival platform mixed up with Life Guards, officials and carriages. Suddenly order came out of chaos and I found myself (like everyone) fixed rigid and close beside the old G.W.R. royal saloon with the dome in the roof. Moreover, standing at the junior end of a row of six Kings (*sic*)—as Homer would have put it, "Himself the seventh but not of them." They (and I) were lined up across the platform facing inwards like a guard of honour. On our right was the gun carriage, with King Edward facing the royal saloon, the German Emperor on his right and the Duke of Connaught on his left. Eight sergeants of the Guards very slowly carried the coffin past our line and into the saloon (converted into a chapel), saluted, came out and melted away. Then the old G.W.R. guard came along, shut the two folding doors and locked them—a most moving act as it seemed to be then really "the last journey." We had all stood like statues with bowed heads for about ten minutes.

The moment the guard went down the train King Edward said in his guttural voice, "Come along, hurry up, we are twenty minutes late already." For, I reckon, twenty minutes from the arrival of the gun carriage till the train was out of sight massed military bands, on the departure platform, reinforced by massed drums, never stopped playing Chopin's Funeral March. This masterpiece is always thrilling. Under the threefold vast glass vaulting of Paddington, and played like musical thunder, I can only say the effect was stupendously overwhelming.

Ten days later Sir William Acworth wrote to Edinburgh to me, "I saw you in the Pavilion Theatre last night." I replied "Nonsense, I was in Edinburgh." He retorted, "Yes I did, and you were about twelve feet high and had on a huge Highland bonnet; the last man in a mixed company." So I found I had been filmed in the act, and so was able to see it had not been a mere weird dream.

I remain, Yours mournfully,

NORMAN DORAN MACDONALD

Statistics of Railway Operation

York, January 24

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—With reference to my letter printed on page 98 of your issue of January 17, and the note appended to it of your correspondent's comments upon it, I am glad to observe that he accepts the value of my criticism on Item 4 of his article. I was thinking most, when I wrote my letter, of how traders who are dissatisfied with the journey time of their consignments would view his conclusions upon the accelerations which the railway companies have undoubtedly effected recently in many of their journey times, particularly in the case of the urgent traffics carried in braked trains.

Traders often speak to me about railway transit, and from what they say, one cannot but realise that there is much dissatisfaction with the time occupied, as compared with that given by road. They welcome the improvements that have been made, but urge that even more might be done. They argue that these statistics are acting as a deterrent, and that if more attention were paid to increasing revenue, even if this means that some of the operating statistics look worse, the financial result to the railways would be better. They also contend that the only satisfactory test is net revenue, as is true of all business concerns working for profit. They also point out that many businesses are having to increase their ratio of working expenses in order to increase their profits, knowing that money has to be spent in order that money may be made.

A further point put forward against too much importance being attached to the Ministry statistics is that these may show improvement at the same time as railway revenue and profits are going down. I think this cannot be denied, as the following illustration will show:—

> The tonnage from A to B is 1,000 per day, and requires two trains. It falls to 600, which can be hauled by one train. The ton-miles per engine-hour are better, but the revenue and profits are less.

Another point is the one dealt with in my first letter, viz., that your correspondent's Item 4 presents too rosy a picture, because traders find that so much of the journey time consists of standing time in stations and marshalling yards. The only time that interests them is that from the time the consignment is ready to leave their premises to the time when it is in the premises of the consignee. If your correspondent could show them figures showing an improvement in this respect, it would appeal to them much more.

Yours faithfully,

H. A. WATSON

PUBLICATIONS RECEIVED

Mathieson's Handbook for Investors for 1936. London: Fredk. C. Mathieson & Sons, 16, Copthall Avenue, E.C.2. 6½ in. × 3½ in. 355 pp. Price 5s. net.—Now in its 37th year of issue, this handy publication gives a useful and concise record of Stock Exchange prices and of dividends for the past ten years of selected securities, particulars of which for 1935 are compiled up to the end of November. Investments are grouped under 29 main headings, and a comprehensive index facilitates reference to any security mentioned in the publication. At the end of the book will be found the dates of Stock Exchange settling days and holidays, a perpetual yield table, and information as to trustee investments and income tax.

Hutchinson's A to Z Timetables. Proprietors: The Red Rail Guide Co. Ltd. Publishers: Hutchinson & Co. (Publishers) Ltd., 34, Paternoster Row, London, E.C.4. 7¼ in. × 4¾ in. × 1¼ in. 876 pp. + 32 pp. maps. Monthly. Price 2s. net.—With its February issue, considerable alterations have been made in this timetable, which is now divided into six parts. The first part, comprising the A to Z section, contains the names of every town in Great Britain to which services are shown in the timetables, with a gazetteer, including map reference indicating the number of map and position on which the town is to be found; the first and third class fares and railway mileage from London; market days, closing days, and population. The rail, coach, and air services from London are either shown in full in this section or a reference is given to the secondary stations section or the table section in which the services are given. Part II, called the secondary stations section, is printed on pink paper. It gives a list of places more rarely visited by travellers from London, and shows main line connecting stations and the best method of proceeding therefrom to the ultimate destination. The complete Green Line coach services of London Transport are also shown in full, together with sketch maps of picking-up points in the central area.

Part III, the local table section, opens with a map of Central London. This is followed by local train services to and from London within a radius of 30 miles. Fares from London are given on the respective tables. A selection is also included of tables local to other large towns. The foreign travel section, Part IV, is on green tinted paper. It is devoted in the main to air services with times and fares to principal places throughout the world, but also gives brief details of services and fares by train and boat. The sea travel section, Part V, which follows, is also on green paper, and is really complementary to Part IV. It gives for six weeks ahead all passenger steamship sailings from British ports to the principal places throughout the world, showing the name of ship, tonnage, and date of sailing. The final section, Part VI, comprises 32 pages of maps showing all the stations in Great Britain given in Part I, with railways, principal roads, R.A.F. aerodromes, civil airports, and landing grounds.

Railways and Roads in Pioneer Development Overseas. By J. Edwin Holstrom. London: P. S. King & Sons Ltd. 8¾ in. × 5¾ in. × 1½ in. 304 pp. Diagrams and tables. Price 15s.—The question of whether to build a road or a railway to open up an undeveloped area overseas is a very complicated problem which is not completely solved by this treatise, although much longer than necessary for the ground it covers. The conclusions are based on assumptions which are very debatable. For instance, when comparing the carrying capacities of roads and single line railways, the author shows theoretically that it is possible to pass 1,535 motors an hour at an average speed of 20 m.p.h. along a roadway, and one train an hour at an average speed of 15 m.p.h. along a railway in each direction. For the former he takes a "fraction of availability" of 1/20, and for the latter 1/10. This last is to allow for "that chronic shortage of rolling stock from which so many railways in overseas countries suffer." But in considering a new railway, surely so severe an assumption should not be made in calculating its capacity. The treatise, however, is very comprehensive when considering the cost of maintenance and running of roads and railways, but the initial outlay in either case is a very variable figure, since the cost of construction depends so much on local conditions. The whole book is an economic study which forms a guide to a method of attacking the problem, and includes a list of 166 books which would prove useful for reference purposes.

Merseyside: Co-ordination of Passenger Transport Services. Liverpool: The University Press, 177, Brownlow Hill. 8½ in. × 5½ in. 40 pp. + folding map. Price 1s.—In recent years increased attention has been paid to examining whether the passenger transport facilities of Merseyside are adequate. A conference representative of the four Merseyside boroughs has been considering the question of co-ordinating their services, and therefore the present publication is timely. It is the second of a new series of reports prepared by the Social Science Department, Statistics Division, University of Liverpool, for the purpose of keeping up to date some of the more important information in the "Social Survey of Merseyside." The present treatise has been compiled by Mr. T. S. Simey, Lecturer in Public Administration, and Dr. C. D. Campbell, Lecturer in Commerce. It is divided into four chapters, namely: Character of the Area Served; Description of Undertakings in the Area; Adequacy of Services Provided; and How can Co-ordination be Promoted? In general, it is a useful study of the subject, clearly set out, and contains six handy statistical tables summarising the accounts of the Liverpool, Birkenhead, and Wallasey Municipal transport systems; the Liverpool Overhead and Mersey Railways; the ferries; and the Mersey road tunnel. The remarks on co-ordination are considerably impaired, however, by relying (at any rate, to some extent) upon false premises. In the descriptions of the undertakings it is stated that Ribble Motor Services Limited is "virtually controlled by the L.M.S.R.," and again, "competition . . . between Ribble and L.M.S.R. really does not exist, owing to the control which the railway company exerts over the bus company." Similar remarks are applied to Crosville Motor Services Limited in its relations with the L.M.S.R. and G.W.R. Although it is well recognised that these railways own substantial shareholdings in the bus companies concerned, these do not amount to control; the railway holdings are not more than 50 per cent., and are not larger than those of road holding companies; and the railway nominees are not in the majority on the bus directorates. We are fully aware of the valuable co-ordination which has already resulted from the work of the standing joint committees set up following the acquisition of the railway shareholdings, but the bus companies are under "road" management and complete uniformity of purpose is still far from achievement. This fact should be borne in mind by any student of passenger transport co-ordination.

Great Western Docks, 1936. Produced and published by H. N. Appleby by arrangement with the Great Western Railway Company. 10⅞ in. × 8 in. × 1 in. 332 pp. and folding maps.—This handbook, issued by one of the largest dock owners in Great Britain, is impressive in its scope. "Britain's Western Gateways" is the title justly claimed for these ancillary concerns of the G.W.R. In addition to providing such information as the various scales of rates and charges, the facilities available at each port or dock are given in some detail. Many illustrations are included to supplement these descriptions. Maps and large-scale plans are also provided.

Bearing Bronzes.—An addition to the series of informative pocket booklets of technical data issued by the Copper Development Association, Thames House, Millbank, S.W.1, is one dealing with bearing bronzes. It is shown how copper-tin bearing bronzes and copper-lead bearing alloys fulfil the requirements of minimum friction, structural strength, resistance to wear, and toughness, and many examples of representative castings are illustrated. There is a table of typical bearing bronzes in which are given nominal percentage composition by weight, average mechanical properties, and applications. A concluding chapter deals with some general points to be observed in the installation of bronze bearings.

THE SCRAP HEAP

"My relations with other departments continue to be friendly."—*Mr. C. R. Byrom at the annual dinner of the Chief Operating Manager's Department, L.M.S.R.*

* * *

Mr. H. W. Payne, Principal Assistant to Chief Goods Manager, Great Western Railway, as recorded in the report on page 262 of this week's issue, finding prose inadequate, spoke in verse in proposing the toast of "The Visitors" at the annual dinner last week of the G.W.R. Chief Goods Manager's Office staff. Below we reproduce, with Mr. Payne's permission, a few examples of his efforts:—

THE VISITORS

Gentlemen, now I will strike the lyre
Poets conceive their lines at first
Then deliver with ardent fire,
Or burst!
Here is a warning, there a poke,
All of good humour made compact,
There is a pun, perhaps a joke,
React!

Keep your hands from picking and stealing
Or you'll surely be found out,
STEPHENS has his eye on you
He'll catch you without a doubt;
And PINE will consult an ancient Act
and bring you before the "beak"
Who'll give you hard for fourteen days,
or you might escape with a week;
But poetic justice might someday be done and 'twill stand to the world for a sign,
When PINE shall prosecute STEPHENS and STEPHENS put handcuffs on PINE!

The press—we've had the law—here are the prophets,
Our feeble efforts sometimes find a niche
Within the august journals whose high priests now grace our table,
You see that I'm so awed I am not able
In rhyme to write,
But we would like to know to-night
If KAY has Modern Transport vetted
And LAMB would like to be gazetted.

WILKINSON, MATTHEWS and POTTER, ORTON, DEWAR and GRAND,
Engaged in superintending the line in various parts of the land,
With one accord on Christmas Eve when the trains get later and later,
Debate in secret, or say they do, and the thought of each debater
Is to write upon the departure list in capitals large and clear,
"If you want to go away by train—you can't do that there 'ere."
Has ELLIOTT come to the railways or the railways gone to him,
Is he with cranes and lorries and carts,
All of the railways or only three parts,
Is he the hub and the spokes of the wheel while we are only the rim?
If in his business of clearing house we want to have a say,
Does he give his approval to household removal we think ought to come our way?
We welcome him here and we're quite sincere, though we don't make much of a fuss,
For though Douglas no longer keeps Mary—Pickford will soon keep us!

Who can discover the cost of a train
As it goes from the South to the North,
Has POLLARD yet worked out the problem
Or is it one he will set FORTH?
Accountants in history add up in mystery
Concealing by nod and by wink,
The figures they make are what you have to take
And they don't care two hoots what you think,
But we somehow feel sure that as earnings enure
If they don't multiply they divide,
They may leave us to guess but to-night they'll say "Yes,
There has been a bit put aside!"

* * *

Our American contemporary the *Railway Age*, commenting in a recent issue on the intended Government investigation into U.S. railway finances, remarks: "The railroads need not fear this investigation. There will be so much noise made within the next year about the recent financing of the Federal Government that, by comparison, the 'disclosures' regarding railroad financing will attract about as much attention as would have the explosion on a 'cracker' during the bombardment of Verdun."

* * *

"Of the men who have served with me in various offices, Sir George Murray, long since retired from office, but happily still with us, did most to lighten official labours. He was raciest in conversation as when, having failed to persuade me that something I proposed to do was inexpedient, he asked: Well if you must do a silly thing like that, is it necessary that you should do it in such a d—— silly way? and proceeded to indicate a much better method of carrying out my idea; or again, when he had at last wrung from me a confession that a Post Office appointment which I had suggested and he had opposed was not wholly uninfluenced by parliamentary considerations, he cynically exclaimed: Oh! if it's a job, why did you not say so at once? It's as good as done.

"Asquith, when Chancellor, told me that he had had before him a proposal for the construction of an underground passage from the War Office to the Horse Guards with cellars where papers might be stored and work carried on in case of aerial attack, upon which Murray had minuted: 'This may be safely turned down. No sane enemy, acquainted with our institutions, would destroy the War Office.'"—*From "Down the Years" by the Rt. Hon. Sir Austen Chamberlain, K.G., P.C., M.P. (Cassell & Co. Ltd.).*

* * *

Galway County Council has accepted the offer of the Great Southern Railways Company to purchase the Corrib Viaduct, which carries the disused Clifden line, for £10.

* * *

REFORMED CONVICTS BUILD RAILWAY

A press telegram from Moscow states that enough bridges to stretch across the English Channel have been built by gangs of reformed Russian convicts while building a railway which will speed-up communication between Moscow and the Far Eastern provinces of Soviet Russia.

The line runs from Lake Baikal, Siberia, to Habarovsk, an important town on the Soviet-Manchukuo frontier. Much of the ground where the line has been laid is always frozen. Vast tracts of forests had to be cleared, and many thousands of tons of rocks and soil removed. The single-track line which already ran from the Siberian lake to Habarovsk is stated to be out of date, and of little use for modern trains; it has now been replaced entirely.

* * *

CENTENARIAN RAILROAD EMPLOYEES

The Mutual Magazine, issued by Pennsylvania Railroad employees, recently included a portrait and biography of Mr. Joseph R. Jones, the oldest retired employee of the Pennsylvania Railroad, and possibly the oldest living railroad man in the United States, who completed one hundred years of life on September 29 last. He was Supervisor of Signals of the Philadelphia division, and for the last 11 years has been living in the Soldiers' Home at Washington, D.C. Two other retired Pennsylvania Railroad System workers have reached the age of 100 years since the retirement records have been kept, beginning on January 1, 1900. They were Mr. Thomas Gallagher, foreman on the Long Island Railroad, who retired April 1, 1908, and died July 21, 1930, aged 102, and Mr. Kirby C. Jackson, Fort Wayne division engineman, who retired April 1, 1902, and died December 24, 1933, aged nearly 102.

OVERSEAS RAILWAY AFFAIRS

(From our special correspondents)

SOUTH AFRICA

Responsibility Bonus for Railwaymen

Mr. O. Pirow, Minister of Railways, announced at a recent meeting in Pretoria that it was the intention to pay a responsibility bonus to railway employees between the rank of white labourer and the grade carrying a salary of £600. The Minister said this bonus would not be permanent but would be paid only in view of the greater pressure under which so many employees were working. Those earning over £600 might also receive something but not as much as those earning under £600, the reason being that officials earning over £600 were, in most cases, already being paid adequately for the responsibility attaching to their work.

The position of married white labourers would be improved by providing them with a suit of clothes twice a year, while all white labourers, married or single who were doing night work, would be provided with overcoats. These improvements would be permanent. The Minister, however, stated emphatically that there was no intention of increasing permanently wages and salaries. Such a step would only mean that in times of depression salaries and wages would again have to be cut down, and this was a step which should be avoided. But a fund was being built up to the strength of £4,000,000 to keep the workshops going in times of depression.

Dealing with unemployment in general, the Minister said he was not concerned about skilled men as these could all be absorbed in view of the tremendous industrial development. The Government was, however, taking all possible steps to find work for the fit and semi-fit. The former were being absorbed rapidly and at present 43,000 were being employed by the Government or their employment subsidised. Provision was also being made to look after the underfed children of railwaymen and the housing of the families, if necessary, with the co-operation of the municipalities.

NEW ZEALAND

Racehorse Traffic

Horse racing in New Zealand is very much a national sport, there being few days in the year on which a meeting is not held in some part of the Dominion. As the road conveyance of horses by privately-owned "floats" competes with rail traffic, the Railways Board has decided that attendants, travelling by train to take care of racehorses *en route*, will be carried free, an attendant being allowed for each horse carried: hitherto attendants have been carried at half fares. Already a 25 per cent. rebate is allowed off standard rates for racehorses attending meetings, and it is hoped that this further concession will help to produce larger "fields" and consequent additional attendances of rail-borne passengers at race meetings.

East Coast Railway

It now appears certain that work upon the East Coast Railway, between Napier and Gisborne (North Island), will be proceeded with almost immediately by the new Labour Government. When the previous Government stopped this work in 1930, £3½ millions had already been spent upon it. It is estimated that an additional £1½ millions will enable this 150-mile line in new territory to be completed. Following a special inspection by the Minister and Chief Engineer of Public Works, a Government announcement favourable to the project is expected, in which case the work will be carried through as a State enterprise and not by a private company as appeared likely a few months ago.

Increased Net Revenue

For the eight four-weekly periods of the current financial year to November 9, the total revenue amounted to £3,893,653, as against £3,719,253 for the same period last year, giving an increase of £174,400 in the revenue account. The working expenses for the current year to date amounted to £3,539,682, as against £3,370,837 last year, an increase of £168,845 after absorbing the 5 per cent. increase in salaries and wages and meeting the arrears as from August 1 on account of the 7½ per cent. increase in salaries and wages. The net revenue to date, after meeting the increased expenditure, due to percentage restoration in salaries and wages referred to, shows an increase of £5,555.

ARGENTINA

Engineering Functions

The annual meeting of the Buenos Aires Association of the Institution of Civil Engineers was held on December 5, Mr. L. A. Woodbridge, M.Inst.C.E., Chief Engineer, Central Argentine Railway, being in the chair. Mr. J. H. Taylor, M.Inst.C.E., Honorary Secretary, presented the report on the year's work, which consisted of papers read before the association and visits by the members to places of professional interest. The committee specially thanked Messrs. Ronald Leslie, General Manager, Central Argentine Railway, and D. M. MacRae, General Manager, Cordoba Central Railway, for travelling facilities on the occasion of the visit to Tucamán in September last.

In Buenos Aires the King's Silver Jubilee was celebrated on May 31 by a dinner given by the Centre of British Engineering and Transport Institutions, at which 223 members and guests were present. A message of loyal congratulations was sent to His Majesty, who conveyed his thanks for this message through the British Ambassador. The report also mentioned that in August last the members of the association had the pleasure of welcoming the President of the Institution, Sir Richard Redmayne, K.C.B., who was visiting Argentina under the auspices of the Ibero-American Institution of Great Britain. Sir Richard delivered two lectures before the Faculty of Engineering of the Buenos Aires University, and gave an address before the Centre of British Engineering and Transport Institutions on "The Mechanisation of Industry." A vote of thanks was accorded to the retiring chairman and committee for their services during the year, as also to the Secretary of the Centre, Mr. L. W. Smith. The following committee was elected for the coming year:—Messrs. L. A. Woodbridge, M. F. Ryan, F. L. Creswell, J. H. Taylor, G. H. Austin, H. A. MacGillicuddy, J. G. Duncan, W. G. Pound, H. W. Stevens and F. W. Butler. Student members: Messrs. G. L. Burton, H. R. Cork and T. Rodgers.

Transandine Railway to be Rebuilt

It is satisfactory to be able to announce that the Argentine Government has decided that through railway communication with Chile must be re-established as soon as possible. A decree issued by the Ministry of Public Works on January 3, authorises a sum amounting to $5,614,489 paper to be spent on the reconstruction of the section of the line destroyed by the floods and avalanche of January 10, 1934. Six months are allowed from the date of the decree for starting the work, which must be completed and the whole line ready for service within two years.

Grain Elevator Scheme Approved

A decree issued by the President of the Republic approved in general the report of the Government committee appointed some months ago to study a scheme for building a chain of terminal grain elevators at an estimated cost of $64,154,000 paper, as outlined in THE RAILWAY GAZETTE of February 15 and June 28, 1935. The Ministry of Agriculture is authorised to call for tenders for the construction of all or some of the elevators, and also, it is stated, to negotiate for the expropriation of the 80,000-ton elevator in Rosario, situated on land owned by the Central Argentine Railway, and the property of the "Corporación Americana de Fomento Rural," its purchase price being included in the total

mentioned above. Payment for the work may be effected either in Government bonds or in cash. The "minimum plan" submitted by the committee for the construction of a chain of local elevators is also approved, provided that its cost does not exceed $38,361,500 paper. This part of the scheme provides both for the construction of new elevators, and for the conversion into elevators of existing sheds at railway stations. The Ministry of Agriculture is also authorised to call for tenders for the construction of 100 portable grain-loaders, at a cost of $750,000 paper, for receiving and discharging grain in bulk.

Construction to be Begun at Once

The committee recommends that the construction of the elevators should be put in hand immediately, a beginning being made with 15 units having a total storage capacity of 654,100 tons. These are to be distributed over 12 ports, and to cost not more than $55,623,000 paper, plus $3,200,000 for dredging and other subsidiary works. To this sum has to be added 3 per cent. for inspection and administrative charges, and an additional 5 per cent. for contingencies, bringing the total cost up to some $60,074,000 paper. It is estimated that the probable cost of expropriating the Rosario terminal elevator, referred to above, will bring the total sum to $64,154,000 paper.

Railway Telegraphs Decree: B.A.G.S.R. Appeals to the Courts

The Buenos Ayres Great Southern Railway is [as foreshadowed in our issue of January 31—ED. *R.G.*] resorting to the courts in an effort to obtain the annulment of the decree suppressing railway telegraph offices in places where there is a P.O. service, on the grounds that this is both illegal and unconstitutional. In a carefully-reasoned appeal to the courts the company quotes a number of laws in which the operation of the railway telegraphs is expressly authorised and duly provided for, and which constitute a valid and legal concession which obviously cannot be arbitrarily cancelled by the stroke of a pen. As a case in point, the company quotes the concession granted to the railway for the extension of the line from Bahia Blanca to Neuquen as containing a clause relating to the tariffs to be charged and other matters affecting the operation of the railway telegraph service. The company has also lodged a claim for compensation for the financial loss incurred since the decree came into force on October 15 last, due to its having been compelled to retain a large number of surplus telegraph clerks, for whom there is now no work, as a result of the restriction of the telegraph service. The company's action—which, presumably, is in the nature of a test case—was taken only as a last resort after representations to the Government asking for the decree to be cancelled had proved fruitless.

INDIA

Railway Budget

The Railway Budget will be presented in the Central Legislatures on February 17. A meeting of the Standing Finance Committee for Railways will be held at New Delhi for the consideration of the budget proposals. There is now little hope that the railway receipts for 1935-36 will come up to the original estimate of Rs. 93½ crores, as the total approximate gross earnings of all State-owned railways from April 1 to December 20, 1935, amount only to Rs. 61·83 crores, representing a deficit of nearly Rs. 88 lakhs on the actual earnings for the corresponding period of 1934-35. The revised estimate of receipts will, therefore, have to be considerably reduced, and the ultimate deficit on the working of the Indian railways during the year is likely to be very much in excess of the original estimate of Rs. 1.90 crores.

No Contribution to Federal Government Likely for Some Years

Though the prospective deficit will be met, as in former years, by a temporary loan from the Depreciation Fund, the continued failure of railway revenues to cover in full the charges thereon is a question of serious concern to the Government of India. The financial investigations connected with the inauguration of constitutional reforms in the Central and Provincial Governments took into account an annual contribution of Rs. 5 crores from the Railway Department to the Federal Government. For some years to come this contribution is not likely to be made. Moreover, the annual raids upon the Railway Depreciation Fund may reach a limit when further incursions will react seriously upon the maintenance of railway stock and equipment in sound condition. The railway administrations, it is understood, are not pessimistic of the future, and hold the view that recovery from the severe depression of past years must be a gradual process. In spite of the set-back in the current year, the railway earnings are considerably above the figures for 1933-34.

Central Publicity Bureau Report for 1934-35

The annual report of the Central Publicity Bureau of the State Railways for 1934-35, estimates that there was an increase during that year of from 20-30 per cent. in tourist traffic to India. There was a very large increase in the use of the special tourist saloons by overseas visitors also. An outstanding feature has been the increase of small individual tourist parties, an increase that seems likely to continue, and one that indicates a growing confidence among the travelling public in travel facilities and safety in India generally.

A Transport Pageant

Celebrating the Diamond Jubilee of the rule of His Highness the Gaekwar of Baroda, the Baroda State Railways organised a pageant depicting the evolution of transport in India from the earliest times, and culminating in a display of railway and motor transport of the new era. The pageant was held in the flood-lit grounds of the Railway Institute, to which the railway officers and staff invited the Maharaja as guest of honour. After congratulating His Highness on the Diamond Jubilee of his reign, the Manager and Chief Engineer reviewed the development of railways in the State, as encouraged by the Maharaja, and presented him with a model engine in silver and gold.

AUSTRALIA

The Trans-Australian and Air-conditioning and Diesels

The Trans-Australian Railway with its hundreds of miles of desert, dust and heat, would appear to be an ideal section of line upon which to test the efficacy of both diesel traction and air-conditioned passenger stock. It is hardly surprising therefore, that the Railway Department of the Commonwealth Government has arranged to equip a dining and a lounge car with the latter and is considering the use of the former on that line.

CHINA

Chekiang-Kiangsi Railway Extension

Invitations were issued by the railway authorities for the inaugural ceremony of the newly-constructed section of line from Yushan, on the Chekiang-Kiangsi border to Nanchang, capital of Kiangsi Province, on January 15.

The Government has approved the issue of bonds totalling $27,000,000, which are to be devoted to the construction of the further extension of this line from Nanchang to link up with the Canton-Hankow Railway.

UNITED STATES

Light Coach for Standard Trains

The Edward G. Budd Manufacturing Company, builder of the Burlington Zephyr trains, has just completed an experimental standard-sized passenger coach for the Atchison, Topeka & Santa Fe system. This coach, built of stainless steel, is structurally as strong as a standard steel coach, but it weighs only 41½ tons (of 2,000 lb.) or about 40 per cent. less than an ordinary coach. The coach will be used in regular service with ordinary rolling stock. If it stands up satisfactorily, it will point the way toward equipping the American railways with lighter cars.

FURTHER IMPRESSIONS OF OVERSEAS TRANSPORT

II—How the South African Railways deal with the native and language problems

By A. W. ARTHURTON, M.Inst.T., formerly Secretary, British Railways Press Bureau

JUST beyond Kimberley the railway divides, one line going north to Rhodesia and the other north-west to the Transvaal and Johannesburg. The former route runs westward at first, and thence through the valley of the Marico with its rich fruit orchards. Kimberley was 95° in the shade, and we were glad to escape from its sun-baked streets.

A tropical storm on the way presented some lightning effects more vivid than I have ever seen. The flashes were almost continuous and the long jagged streaks of flame looked like rockets in the sky. Later we ran into the full fury of the storm; the rain was torrential, causing hasty closing of the windows and ventilators, and the peals of thunder so loud that they could be heard far above the noises of the train.

We had been warned that the long journey north was not only extremely hot but very dusty, the dust covering everything with a thick white coat. Luckily this proved not to be the case, as heavy rains after the long drought had washed the red soil free of dust, and rain fortunately preceded us across the Kalahari Desert. The open grass lands of the Kimberley district gradually gave place to bush, which continued to Mafeking. The latter was reached in the early morning and recalled Baden Powell's historic defence for 217 days during the Boer War. It is the principal town in the British Protectorate of Bechuanaland and possesses only one main street, lined with tin-roofed houses in true frontier style.

The station is of the one-sided pattern common in the country, with another low island platform beyond the first line of rails. Provision is made here for watering the trains by means of hose connections which look like huge snakes coiled up along the platform. One of the many statues in South Africa of Cecil Rhodes stands in front of the station.

Travelling Comfort

Travel by day on South African trains is most comfortable. The shutters are drawn to keep out the sun, and a cool current of air comes from the open doors at each end of the corridor, as well as from the ventilators in the clerestory roof. Stops are frequent along the route, giving an opportunity of stretching one's legs from time to time. The leather seats are low and comfortable, and a table folded back to the wall over the wash-basin provides facilities for writing. Additional accommodation for luggage is obtained by letting down one of the panels over the back of the seats and under the luggage rack in the roof.

The coaches are lighted by electricity, and when the temperature is low on the veldt, an electric radiator provides the necessary warmth. Drinking water is freely provided in glass containers, but facilities for obtaining paper cups easily as on European trains would be a boon. Meals, and the journeys to and from the dining car, occupy quite a long time, so that the two days and nights from Kimberley, which seemed so long in anticipation, passed without undue monotony.

The journey over the great Kalahari Desert reminded one of a similar crossing of the Nullarbor Desert in South Australia last winter. There, as in Australia, the natives flock to the train whenever it stops, to sell skins, karosses, carved ornaments and fruit to the passengers. They are far more numerous than in Australia, and their kraals, with circular mud huts and thatched roofs, can be seen along the route. These kaffirs seemed to be of a better type than those in the towns, and live under more natural conditions. Most of them were women and children, the men doubtless being away working in the mines. The boys are naked, save for a loin cloth, and the younger ones have not even that. The girls are decked in gaudy colours, although ragged, and most of the women have the inevitable baby slung at their backs.

The native problem in South Africa is a thorny one. There are far more natives than whites, the latter numbering only about 2,000,000. Native travel on the railways involves a great deal of additional trouble, as separate carriages have to be provided as well as separate waiting rooms, booking offices, lavatories, &c. Station accommodation has thus to be duplicated and at Johannesburg an entirely separate building for natives is provided over the lines inside the main station.

Generally speaking, the native mixes with white men in street and shop, although there are shops with purely native custom, but separate eating and drinking houses exist for Europeans and non-Europeans. In the Cape Province the coloured man has a vote under certain conditions, but in the Transvaal and Orange Free State he has no political rights whatever.

Languages in South Africa

South Africa is bi-lingual, and although English is spoken and understood, particularly in the towns, Afrikaans or Dutch is equally used. In fact, every public notice is in both languages, which seems to the visitor unnecessary duplication and expense. On the railways every notice, timetable and instruction is printed in English and in Afrikaans, and employees generally are required to be bi-lingual. It is not for a stranger to criticise, but considering the universality of the English language, it does seem somewhat curious.

Through the whole of Sunday we steamed across the Kalahari desert, which name is really a misnomer, as the whole area is studded with small trees and covered with low scrub like some of the English forests. Its lack of moisture is certainly pronounced, and rain seldom falls, but game is said to be plentiful, and Bushmen inhabit the north-western portions. Formerly lakes existed in various parts, the largest of which was Lake Ngami, considerably shrunken since Livingstone discovered it. Schemes have, I understand, been considered for irrigating this vast area by damming the Zambezi in the upper reaches, but the practicability of the project is doubtful.

At Palapye Road we passed through the territory of the Bamangwato people, whose town of Terowe, 35 miles from the railway, is the largest native town in South Africa.

A hundred miles farther north Francistown, in the Tati Concession, was reached, whence it has been proposed to link up the railway with Walvis Bay in South-West Africa by a line crossing the Kalahari Desert from Gobabio.

NEW DISTANT SIGNALS ON THE SWISS RAILWAYS

Introduction of a third indication

WE referred in an editorial note in our issue of March 8, 1935, to the origin and working of the standard disc distant signal used on the Swiss Federal Railways, an illustration of which appeared in the article on the Swiss system of automatic train control published in our issue of February 2, 1934. The decision to adopt yellow lights for " caution " and, after retaining the white for a time, green for " clear " in these signals was also announced in our columns. Hitherto the distant signal in Switzerland has been worked in the same manner as in Germany, that is to say, it was cleared whenever the signal it announced was cleared, no matter for what route the latter applied. The stop signals—practically all of which are now semaphores—were also constructed on the German plan, and where more than one route was signalled had two—or occasionally three—arms; of these, the uppermost only was visible when the signal was at " stop," the others being closed up in line with the post and their lights obscured. One arm inclined upwards at 45 deg. indicated " proceed," two or more indicated " proceed on a diverging route," the number of green lights corresponding with the arms.

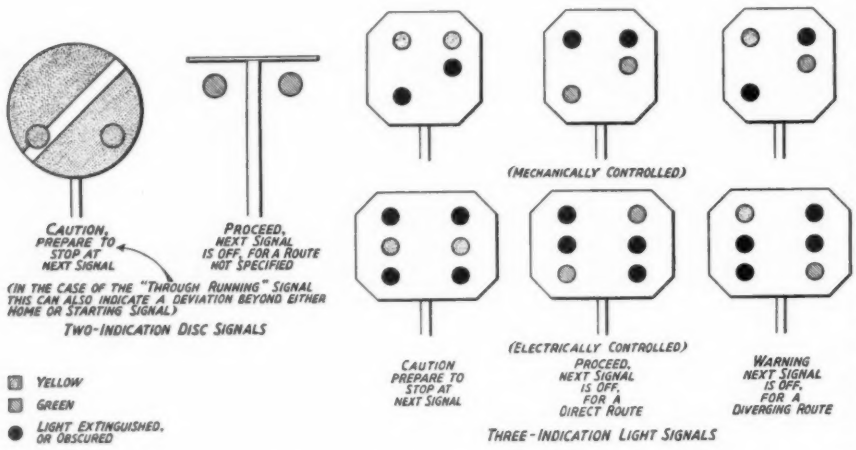

CAUTION. PREPARE TO STOP AT NEXT SIGNAL
PROCEED. NEXT SIGNAL IS OFF. FOR A ROUTE NOT SPECIFIED
(IN THE CASE OF THE "THROUGH RUNNING" SIGNAL THIS CAN ALSO INDICATE A DEVIATION BEYOND EITHER HOME OR STARTING SIGNAL)
TWO-INDICATION DISC SIGNALS
YELLOW
GREEN
LIGHT EXTINGUISHED, OR OBSCURED
(MECHANICALLY CONTROLLED)
CAUTION PREPARE TO STOP AT NEXT SIGNAL
(ELECTRICALLY CONTROLLED)
PROCEED. NEXT SIGNAL IS OFF. FOR A DIRECT ROUTE
WARNING NEXT SIGNAL IS OFF. FOR A DIVERGING ROUTE
THREE-INDICATION LIGHT SIGNALS

Fig. 1—New standard distant signal indications, Swiss Federal Railways

Home signals at the entrance to stations had their own distant signals, and at a great many stations another distant was provided at or near the home signal, repeating the position of the starter. This was thus a kind of express signal, indicating a clear run through. Such an arrangement was long used also in South Germany, in Bavaria especially, but did not become at all general in North Germany till comparatively recent years.

The disadvantages of the old system of two-position distant signals worked as above described were explained in our articles on the new three-indication distant signals adopted by the German State Railway which appeared in our issues of June 17, 1932, and November 17, 1933. As there described, the extra indication has been obtained in Germany by the addition of an arm below the existing disc, and the introduction of a third reflected light, so that three lights appear, two yellow and one green, when the stop signal ahead is cleared for a diverging route. The production of this signal, and the necessary apparatus to work it reliably at the long distances now necessitated by the increased train speeds, involved much thought and experiment.

The introduction of some such signal in Switzerland has often been discussed by experts, but no design has been adopted hitherto, chiefly because of the additional complication involved in solving the problem by the use of mechanical apparatus alone. This would have meant adding something to the existing discs, as has been done in Germany, or introducing an entirely new signal.

The progress made with colour-light signals in recent years, however, offered a means of meeting the difficulty in a comparatively simple way, and it has been decided that all three-indication distant signals shall be of the colour-light pattern. At the same time, it was possible to make a distinction between two- and three-indication signals in the " proceed " position, by arranging the lights in a particular way. The cost of installing light signals of the usual pattern would have been considerable in some places, but this difficulty has been met by adopting the mechanical method of control, already used in this country, whereby the original wire transmissions remain, but powerful lights are provided at the signal and the colours are changed by suitable mechanism. Two experimental three-indication signals of this type are being tried at Gümligen and Hindelbank stations, and the new signalling installation at Brugg is to be arranged to include some of the ordinary, not the mechanically controlled pattern.

The indications to be given in future can be understood from Fig. 1. It will be noticed that the " caution " indication is always the same, *viz.*, two yellow lights placed horizontally. The " proceed " indication of the old disc signals has two green lights similarly placed, replacing the two whites used up till now. In the new three-indication signals this indication has the two lights in an oblique position, upwards from left to right, so that the type of signal is evident at a glance, while the new indication is formed by a yellow light and a green light, downwards from left to right. Thus the meaning of the new signals can be told from the position of their lights, apart from the colour. Four light units suffice for the mechanically worked signals, but for technical reasons six are to be used in the electrically controlled design.

Hitherto, the distant signal repeating the starting signal, or " through running " signal, has been cleared only when both entrance to and departure from the station were made over a direct route, so affording a through run at speed. The new signals will allow of a distinction being made between a stop in the station and a departure over a diverging route. The way in which they can be applied to meet the various conditions met with can be seen from Fig. 2, which illustrates the layout at Brugg station, with

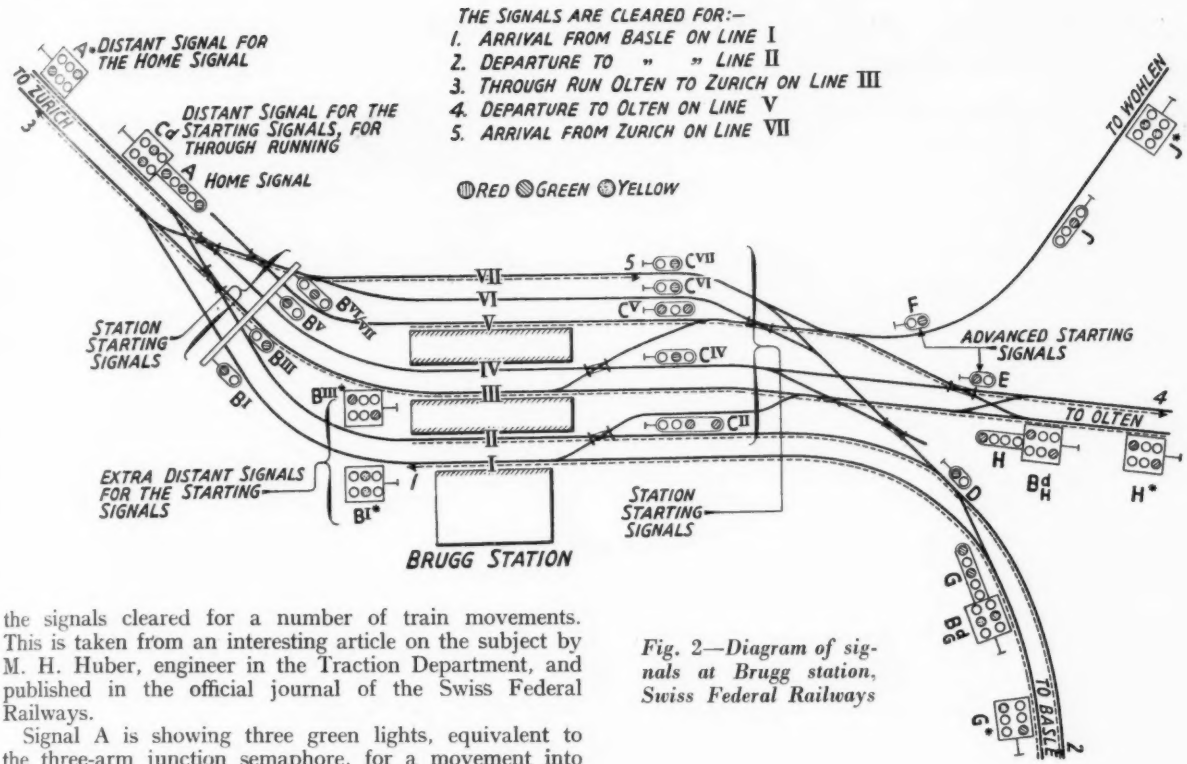
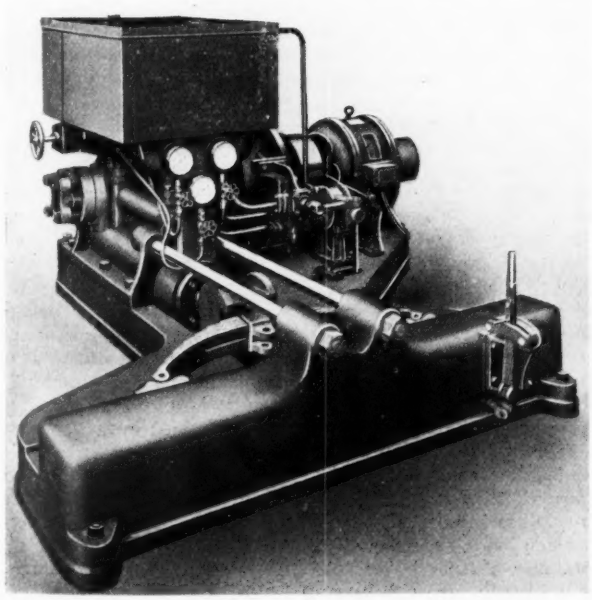

THE SIGNALS ARE CLEARED FOR:—
1. ARRIVAL FROM BASLE ON LINE I
2. DEPARTURE TO " " LINE II
3. THROUGH RUN OLTEN TO ZURICH ON LINE III
4. DEPARTURE TO OLTEN ON LINE V
5. ARRIVAL FROM ZURICH ON LINE VII
RED GREEN YELLOW
A* DISTANT SIGNAL FOR THE HOME SIGNAL
TO ZURICH
DISTANT SIGNAL FOR THE STARTING SIGNALS, FOR THROUGH RUNNING
A HOME SIGNAL
STATION STARTING SIGNALS
EXTRA DISTANT SIGNALS FOR THE STARTING SIGNALS
BRUGG STATION
STATION STARTING SIGNALS
ADVANCED STARTING SIGNALS
TO WOHLEN
TO OLTEN
TO BASLE

Fig. 2—Diagram of signals at Brugg station, Swiss Federal Railways

the signals cleared for a number of train movements. This is taken from an interesting article on the subject by M. H. Huber, engineer in the Traction Department, and published in the official journal of the Swiss Federal Railways.

Signal A is showing three green lights, equivalent to the three-arm junction semaphore, for a movement into the goods lines VI and VII, which is announced by the yellow-green indication at the distant A*, owing to its being a diverging route. The same applies to signal G, where the curvature of the line calls for reduced speed, but only two green lights appear, three being used for a movement into line III. Signal H shows one green light for running direct into the station, distant H* indicating to correspond, while as the starting signal B^{III} is similarly cleared the through running signal B^{d}_{II} is also in the double green position. The use of so many lenses in the signals appears strange to British eyes, but, as is usual in these cases, the indications used are the result of a certain line of development, strengthened by custom, and are therefore quite satisfactory to those who have to read them.

The yellow lights were in use everywhere, we understand, in the distant signals in October last, and the change to green for " proceed " is planned to occur next autumn.



Denison Spring Scragging Machine

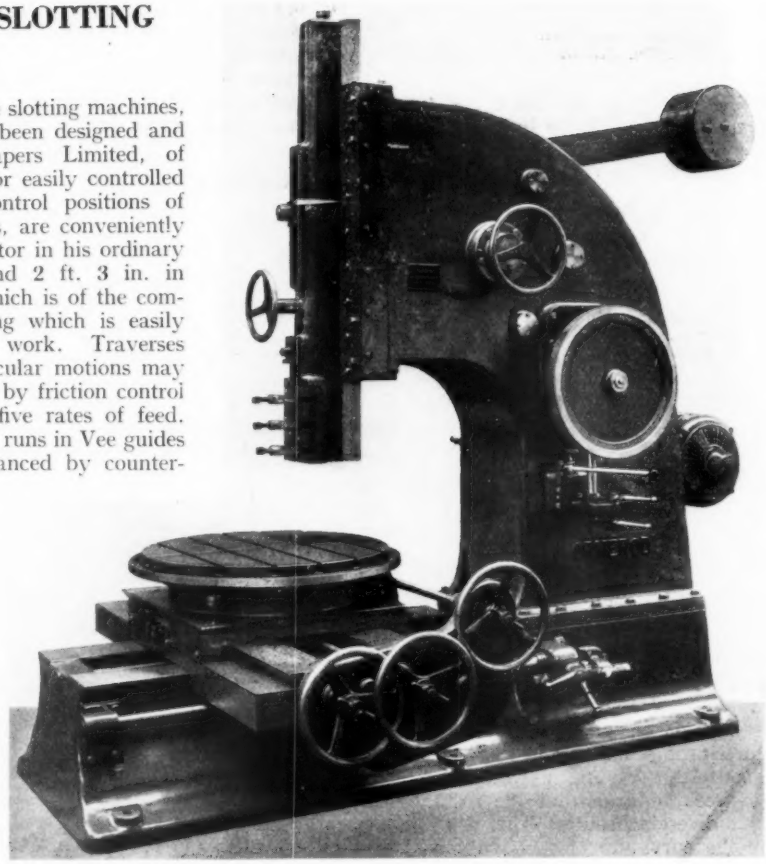
We regret that by mistake the wrong block was placed in the article describing the Denison spring scragging machine on page 154 of our issue for January 24. The machine in question is now shown in the accompanying illustration.

Proposed Three-tier Bridge between Europe and Asia

According to a press message from Istanbul, considerable progress has been made with the plans for building a suspension bridge across the Bosphorus, from designs by the Polish engineer who was responsible for the Golden Gate bridge at San Francisco. The bridge is intended to be 6,774 ft. long, with a channel span of 2,290 ft., and is estimated to take three years to complete. It is designed to have three superimposed tiers, of which the top one will carry a double-track railway providing a direct standard-gauge link between Europe and Asia. The middle tier will be reserved for tramways and vehicular traffic; and the lowest stage, for foot passengers, will contain shops and cafés.

A NEW HEAVY DUTY SLOTTING MACHINE

THESE new heavy duty 20-in. stroke slotting machines, one of which we illustrate, have been designed and manufactured by Ormerod Shapers Limited, of Hebden Bridge, to meet the demand for easily controlled high-speed heavy-duty tools. The control positions of all movements, speed and feed changes, are conveniently grouped within easy reach of the operator in his ordinary position. Work 6 ft. in diameter and 2 ft. 3 in. in height can be admitted. The table, which is of the compound circular type, has worm gearing which is easily disengaged to allow rapid setting of work. Traverses in the longitudinal, transverse, and circular motions may be actuated by hand, or are self-acting by friction control through a reversible feed box giving five rates of feed.



The ram has chilled sliding faces, and runs in Vee guides 4 ft. long by 11 in. wide. It is balanced by counterweight. A large diameter handwheel, projecting from the centre of the main driving hub, enables the stroke to be adjusted from zero to the maximum whilst the machine is in motion, and obviates the use of spanners. There are nine changes of speed to the ram, giving 6 to 40 strokes a minute. The gearbox is built on the unit principle and is housed inside the body of the machine. Change of speed is obtained through two levers. The gears are of nickel chrome steel, heat treated, generated from the solid and mounted on solid multi-splined shafts, accurately ground on dead centres. The drive from the gearbox to the ram is by large double driving gears and a link of the closed-end type. A pump, mounted in a sump in the body, ensures a continuous flow of oil to the bearings, link motions, gearbox, and driving gears. The machine is driven through a single pulley mounted on a powerful friction clutch, located on the opposite side to the working position, or by independent motor drive through vee ropes.

The floor space required for the machine is 11 ft. by 7 ft. 6 in., the working height 11 ft. 6 in., and the approximate weight 6½ tons. The power required to drive the machine at its maximum capacity is 15 h.p.

Locomotive Tests in America

Tests carried out on the Boston & Maine Railway with a class P-4-A 4-6-2 type locomotive built by the Lima Locomotive Works, gave some interesting results. The runs were made between Boston and Portland, a round journey of approximately 230 miles. In one case the locomotive hauled a light passenger train consisting of six vehicles weighing 386 tons, and in a subsequent test a train of twelve vehicles weighing 736 tons. The average drawbar horsepower was increased from 976 for the lighter train to 1,405 for the heavy one, an increase of 44 per cent., while the firing rate rose from 58·0 lb. to 71·4 lb. of coal per sq. ft. of grate per hour, an increase of 24 per cent. The evaporation, including condensate was 8·82 lb. of water per lb. of coal for the heavy train, against 7·94 for the light train, an improvement of 11 per cent. On a drawbar horsepower basis, the coal consumption was 3·39 lb. for the heavy train in comparison with 3·97 lb. for the lighter one, an improvement of 15 per cent. On a 1,000 gross ton-mile basis the improvement in the coal rate was found to be 31 per cent. Before completing the tests the same Pacific type locomotive was given heavy freight trains to handle under trial conditions. On the southbound run the train tonnage was 2,757, and on the northbound run 2,769. A maximum sustained drawbar horsepower of 2,840 was obtained, this being well up to the estimated capacity of the locomotive.

Averaging the results of the two freight tests and the five passenger train tests, a coal consumption rate of 3·065 lb. per drawbar horsepower for the former is obtained, and 3·628 lb. for the latter, an increase of 18 per cent. For the water rate per drawbar horsepower the averages are 24·45 lb. for the freight and 30·26 lb. for the passenger train tests, an increase of nearly 24 per cent. These results clearly demonstrate that the efficiency of the locomotive is largely dependent upon its being used in a service where it can be loaded to somewhere near its capacity. The increase from six or seven to twelve or thirteen passenger vehicles by no means provide a full load. With fifteen cars the results would undoubtedly have shown an even higher efficiency, whilst in fast freight service where an adequate load was obtained, the coal and water rates were considerably improved. The locomotives used in the test have cast steel cylinders 23 in. by 28 in., 6 ft. 8 in. coupled wheels, a total heating surface with superheater of 4,814 sq. ft., and a boiler pressure of 260 lb. per sq. in. The rated tractive force is 40,900 lb., or with booster 52,800 lb.

NEW 3 FT. 6 IN. GAUGE BEYER-GARRATT LOCOMOTIVES FOR NIGERIA

Modern design which overcomes severe limitations of axleload and bridges on a 45-lb. rail section of the Nigerian Railway

THE economical operation of the Western main line of the Nigerian Railway presents a difficult problem in view of the varying rail weights and strength of bridges. From the profile it will be seen that in a length of 843 miles there are five different weights of rail. From Lagos (Iddo) to Offa, a distance of 215 miles, the track is laid with 80 lb. rail, and from this point to Jebba, the 302nd milepost, with 55 lb. rail. From Jebba to Minna, a distance of 160 miles, 45-lb. rails and numerous bridges limit the axleload to a maximum of 9¾ tons. Thence to Zaria, 613 miles from Iddo, there are 60-lb. rails, while the remaining section to N'Guru is again laid with 45-lb. rails.

In view of the fact that the 45-lb. rails are not yet due for renewal, the General Manager, Mr. G. V. O. Bulkeley, C.B.E., M.I.Mech.E., decided that a thorough investigation should be made into the conditions of the bridges and track. This was duly carried out in conjunction with the Crown Agents for the Colonies. Conjointly with this inquiry, the question of the most suitable type of locomotive for the Jebba-Minna 45-lb. rail section had to be considered, and in these studies the possibilities of types such as the Garratt articulated, or the ten-coupled orthodox, were most carefully probed. It was eventually decided to extend the life of the 45-lb. rail, double sleepering the joints and adding intermediate sleepers both on the 45-lb. and 55-lb. rail sections, and also to carry out certain bridge strengthening. Nevertheless, the maximum axleload is rigidly limited to 9¾ tons on the 45-lb. rail.

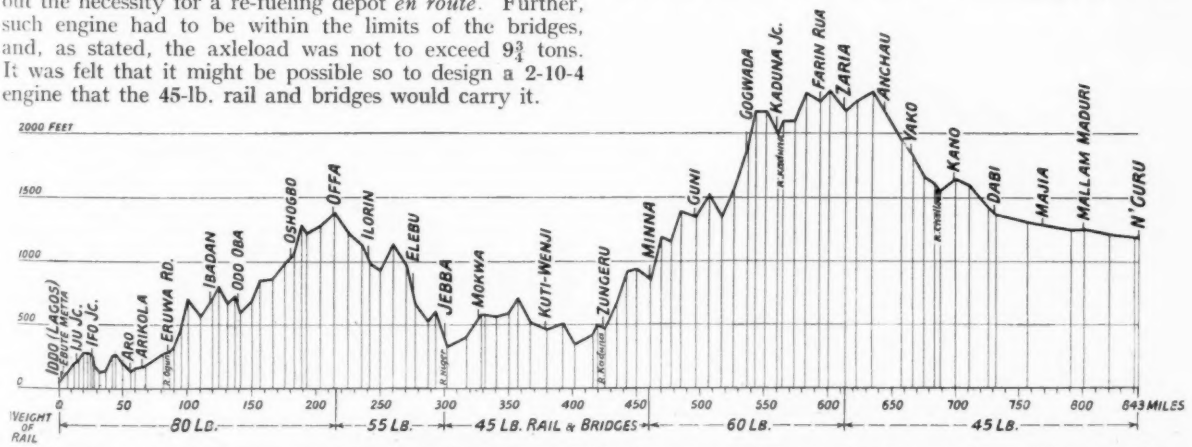
A considerable number of locomotive designs were examined in respect of the Jebba-Minna 45-lb. rail section, including a 2-10-4 3-cylinder non-articulated type. It is of interest here to mention that at both ends of the intermediate 45-lb. section, that is, on the 55-lb. and 60-lb. rails, ordinary two-cylinder locomotives having the 4-8-2 wheel arrangement, and exerting a tractive effort of 32,640 lb. at 85 per cent. b.p., are used. One of these, known as the 701 class, is illustrated herewith. The objective was therefore to obtain an engine of similar power to enable 55-lb. and 60-lb. rail loads to be taken over the Jebba-Minna section without reducing load, and without the necessity for a re-fueling depot *en route*. Further, such engine had to be within the limits of the bridges, and, as stated, the axleload was not to exceed 9¾ tons. It was felt that it might be possible so to design a 2-10-4 engine that the 45-lb. rail and bridges would carry it.

It should here be mentioned that two 4-8-2 + 2-8-4 Beyer-Garratt articulated engines, having a 9¾ tons axleload, were acquired for the Nigerian Railway five years ago. These engines are working over the 45-lb. track section of 87 miles between Zaria and Kano, which section they are able to traverse without re-fueling *en route*. They exert a tractive effort of 40,000 lb. at 85 per cent. boiler pressure, and are the most powerful 45-lb. track locomotives in the world. Their load between Zaria and Kano is 720 tons, or more than double the load of the next most powerful engine.

After an exhaustive examination, lasting some twelve months, it was found that the only type of locomotive which would meet all the limiting conditions was a 4-6-2 + 2-6-4 articulated engine of the Garratt type. With this particular wheel distribution, and by careful designing to keep down weight, a cylinder starting effort at 85 per cent. b.p. of 33,600 lb. could be obtained, which is 5 per cent. in excess of that of the 4-8-2 engines working on the 55-lb. and 60-lb. rails at each end of the Jebba-Minna section.

Four Beyer-Garratt locomotives were accordingly ordered from Beyer, Peacock & Co. Ltd., and have just been shipped. Apart from the fact that the ten-coupled design was practically out of the question because of its concentrated weight, the Garratt articulated type permitted a six-coupled wheel arrangement, thus considerably reducing the stresses and consequent wear of the track on curves, the sharpest of which is 10 chains. Further, a long-barrelled boiler with probably 20 ft. between tube plates is avoided, the Garratt form of construction giving adequacy of boiler power while still permitting simplicity of design.

This decision having been taken, the greatest care has been exercised to incorporate not only the latest experience in Garratt design, but such standards and details as experience in Nigeria in recent years has found to be expedient. Further, every effort has been made to obtain the highest possible efficiency compatible with simplicity of mechanism. The engines are also required for intensive use, and must be as fool-proof as possible, bearing in mind that they are to be operated entirely by African



Profile map of Nigerian Railway main line between Iddo (Lagos) and N'guru showing varying weights of rail on the different sections

native personnel. We have had an opportunity of inspecting the engines both during construction and in their completed state, and by the courtesy of Beyer, Peacock & Co. Ltd., and of Mr. G. V. O. Bulkeley, the General Manager of the Nigerian Railway, we are able to illustrate and describe them herewith.

The strides made in articulated design were brought very clearly to our notice during the inspection and we specially noted the general accessibility, and the attention given to the details of what appears to be a distinct technical advance in Colonial locomotive practice. The locomotives have been designed and constructed to the detailed requirements and specification of Major M. P. Sells, O.B.E., Chief Mechanical Engineer of the Nigerian Railway, and to the inspection of the Crown Agents for the Colonies.

Comparative Test Features

With the purpose of reducing coal consumption, the Research Section of the Chief Mechanical Engineer's Department recently sent samples of Nigerian coal, which has a calorific value "as fired" of 12,000 B.T.U.'s, 10 per cent. ash, and is very smoky, to be analysed by the Department of Industrial and Scientific Research in London. The department's main recommendation was that considerably increased air be provided above the fire. To this end, various experiments have been made in Nigeria with tubular air vents of copper tube expanded through the throat and tube plates just below the heel of the brick arch, with such beneficial results that the locomotives under review have been fitted with four vents each of 3-in. internal diameter. Tests have also been conducted in Nigeria with the "jumper-top" blast pipe of the Great Western Railway pattern. As a result of these and other investigations, and the desirability of testing the "commercial" efficiency of high boiler pressure under Nigerian conditions, opportunity has been taken to include interesting alternatives in the four engines, so that positive comparisons are possible. While all four boilers have been designed to carry 225 lb. per sq. in. boiler pressure, two only will have this pressure at the outset, with cylinders 12¾ in. diameter × 26 in. stroke, while two are to operate at 200 lb. of steam, and have 13¼-in. diameter × 26-in. stroke cylinders. The cylinder arrangement is such that easy conversion from one diameter to another can be made to suit whichever boiler pressure is decided upon after an extended period of trial. Furthermore, one locomotive of each pressure has been fitted with a "jumper-top" blast pipe cap, and one of each with a Kylchap draught arrangement; thus direct comparisons can also be made regarding the efficiency of these appliances.

The Boiler

The principal characteristics of the boiler, which is of the well known Garratt form, with Belpaire firebox, are as follow:—

Heating surface—	
Tubes	1,363 sq. ft.
Firebox and arch tubes	158 ,, ,,
Total evaporative	1,521 ,, ,,
Superheater	323 ,, ,,
Total	1,844 ,, ,,
Grate area	31·6 sq. ft.

The firebox, which is fitted with a sloping grate and rocking firebars, is made of copper, with copper water space stays, those in the breaking zones are of nicrocopper. It is fitted with three arch tubes applied to the plates with Noble's ferrules, while, as mentioned above, four vents of 3 in. internal diameter are arranged through the throat and tube plates just below the brick arch. The ashpan, of special design is self-cleaning and permits the discharge of ashes well between the rails. The tubes and flues are of Corresista corrosion resisting steel, and the superheater is of the Melesco type, with elements of the new Sinuflow pattern. An M.L.S. multiple valve regulator is incorporated in the header.

The boiler is lagged with J. W. Roberts & Company's asbestos mattresses, as are also the firebox, dome, steam and exhaust pipes. Ample washout plugs are provided, and mud hole doors have been fitted in important positions. A mud collector and door are provided underneath the boiler barrel. The smokebox, which is fitted with a spark arrester of the wire cone type, has a small door of Nigerian standard pattern, fastened by 7 dog catches. The smokebox ashes are discharged clear of the line by means of a hot water ash shoot.

The boiler is provided with a blow-down cock; a stop valve is also arranged in the dome, and safety valves are of the Ross pop type. Two No. 9 Gresham & Craven injectors, fitted on the fireman's side, feed the boiler, delivering through Gresham & Craven feed heater top-feed clack boxes. These can be seen in the illustrations between the smokebox and dome.

Wheel Arrangement, Cylinders and Motion

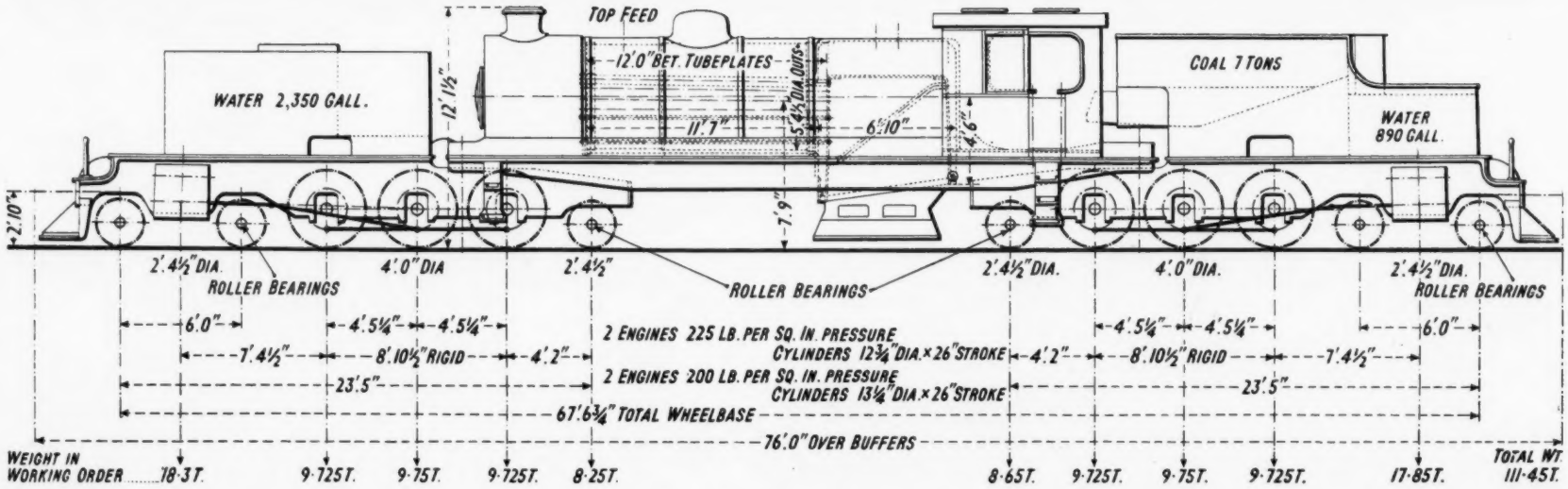
The 4-6-2 + 2-6-4 wheel arrangement, as will be noted from the diagram, incorporates a 4-ft. diameter coupled wheel, this having been selected as the maximum possible for the power required. The engine unit frames, of plate type, are strongly braced throughout their length with steel castings and plates, which with cast steel horns of horseshoe pattern ensure a strongly braced chassis of adequate strength.

The steam distribution of the locomotive has received more than ordinary attention, in order to obtain not only an economical engine by virtue of using steam as expansively as possible, but also a free running engine with the lowest possible back pressure. To this end, 26 in.—the longest stroke practicable with 4-ft. wheels—has been adopted, this, indeed, being exceptional for the cylinder diameters. Also, particularly large piston valves, 8-in. diameter, are used, together with the long travel of 6½ in. The steam and exhaust passages are of ample area and contoured to give the greatest possible freedom. The expansion glands for the steam pipes are of special design with metallic packing, and provided with means of lubrication. The piston valves, arranged for inside admission, are of the four ring trunk type, valve spindle alignment being assured by a crosshead of substantial construction, working in an extended guide. The ports are rhomboidal in shape. The pistons are of the cast iron box type with three narrow rings, and the cylinders are provided with combined pressure release and by-pass valves. Lubrication of the cylinders and valves is effected by two British Detroit lubricators in the cab. Britimp metallic packing is used for the piston rods.

The Walschaerts valve gear is controlled by a steam reversing gear with oil cylinder lock on the boiler cradle frame. The crosshead is of forged steel, fitted with two bronze slippers, and works on a single slide bar in accordance with Nigerian Railway standard practice.

Grease Lubrication and Roller Bearing Axleboxes

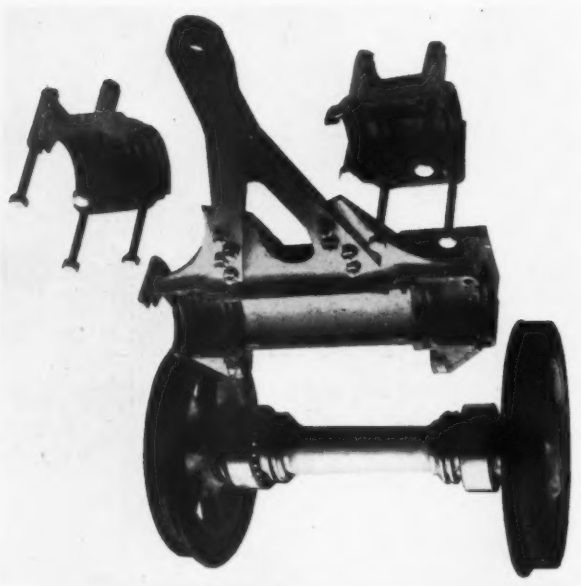
All the motion and side rods, including the big and little ends, are provided with the Tecalemit system of grease lubrication, as are the bogie axleboxes; Ajax grease lubrication is arranged on the coupled axleboxes. The whole of the grease lubricating equipment as fitted to these



Dimensioned drawing and general view of new 4-6-2 + 2-6-4 type Beyer-Garratt locomotive for the Nigerian Railway

locomotives is supplied by Whitelegg & Rogers Limited, and fitted in accordance with that firm's practice.

The bushes in the side rods, as well as the connecting rods, are provided with nickel chrome cast-iron fixed bushes, in which work floating bushes of Cog Wheel brand phosphor bronze, made by the Phosphor Bronze Co. Ltd. The four-wheel bogies and the inner two-wheeled trucks are fitted with Skefko self-aligning roller bearings, the design of which is approximately the same for all the wheels as



Skefko ball bearing arrangement on inner truck

regards the bearing and housing, but for the inner trucks the top castings are connected, as will be noted in the illustration. The grease-lubricated axleboxes are supplied in halves, to facilitate removal and inspection of the bearings. It is the maker's claim that such wheels should run between general overhauls without attention, save for re-greasing of the bearings should axle sets be taken out for the purpose of tyre turning. The inner trucks are arranged with radial arm and control spring, and the four-wheel bogies are of the three-point suspension swing link type, having a total side play of 5 in.

The coupled axleboxes are of cast steel, with bearings of special mixture suitable for grease lubrication; the cheeks are provided with renewable liners; the wheel hubs are also provided with renewable cast iron liners. The tyres are marked with a limit of wear groove, and means for grease lubricating the wheel hubs are arranged in accordance with the Ajax system. The springs, which are underhung, are compensated in two groups, namely, the leading and driving wheels and the trailing and carrying. The boiler cradle frame is carried on flat pivots of the Beyer, Peacock patent adjustable type; with lubrication from the three-feed Wakefield mechanical lubricator which feeds the ball joints; in addition, two grease feeds are provided. Instead of the usual side friction pads, grease lubricated side rollers are fitted, thus improving still further the free running of the locomotives.

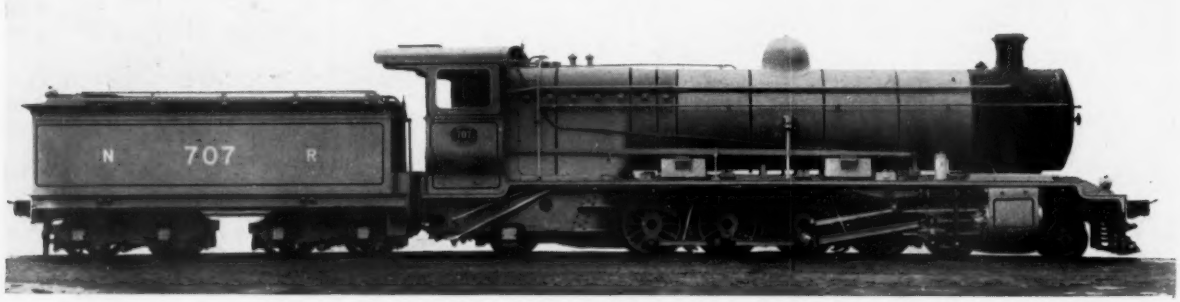
General Equipment

Steam and hand screw brakes are provided for all coupled wheels, and are specially compensated throughout, whilst a Super-Dreadnought vacuum ejector of Gresham & Craven pattern operates the train brake. Gresham & Craven steam sanding is arranged to the front of the outer coupled and to the rear of the inner coupled wheels of each group. Central A.B.C. couplers are fitted, and equipped with rubber draw and buffing springs supplied by Geo. Spencer Moulton & Co. Ltd. The bunker and tanks, which held 7 tons of coal and 3,240 gallons of water respectively, are of welded construction.

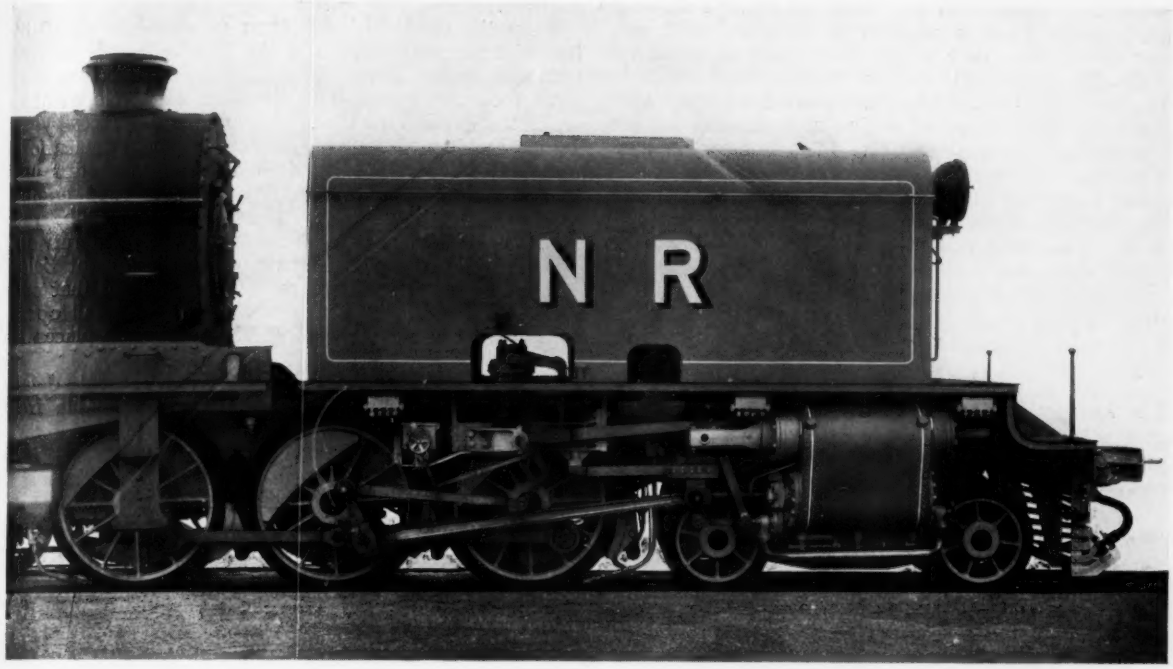
Particular attention has been paid to the design and arrangement of the cab in view of the high prevailing temperature and general equatorial conditions. The floor area is much larger than that of the usual standard gauge engine, and the side openings are cut well back. These can be partially closed by louvre shutter on the outside, and completely by storm curtains on the inside. To reduce further the heat in the cab, steam connections are taken from a turret mounting located on the firebox outside, while two large skylights are fitted in the double roof, as well as two Monarch ventilators. The locomotives are fitted with Stone's turbo-generator and lighting equipment, with headlamps at each end for running both ways. Lamps are also provided to permit easy reading of the gauges and lubricators, which have been carefully located. One locomotive is fitted with a Hasler speed recorder of the Tel. R.T. 835 type for test purposes, this being driven by a flexible drive.

Operating Conditions

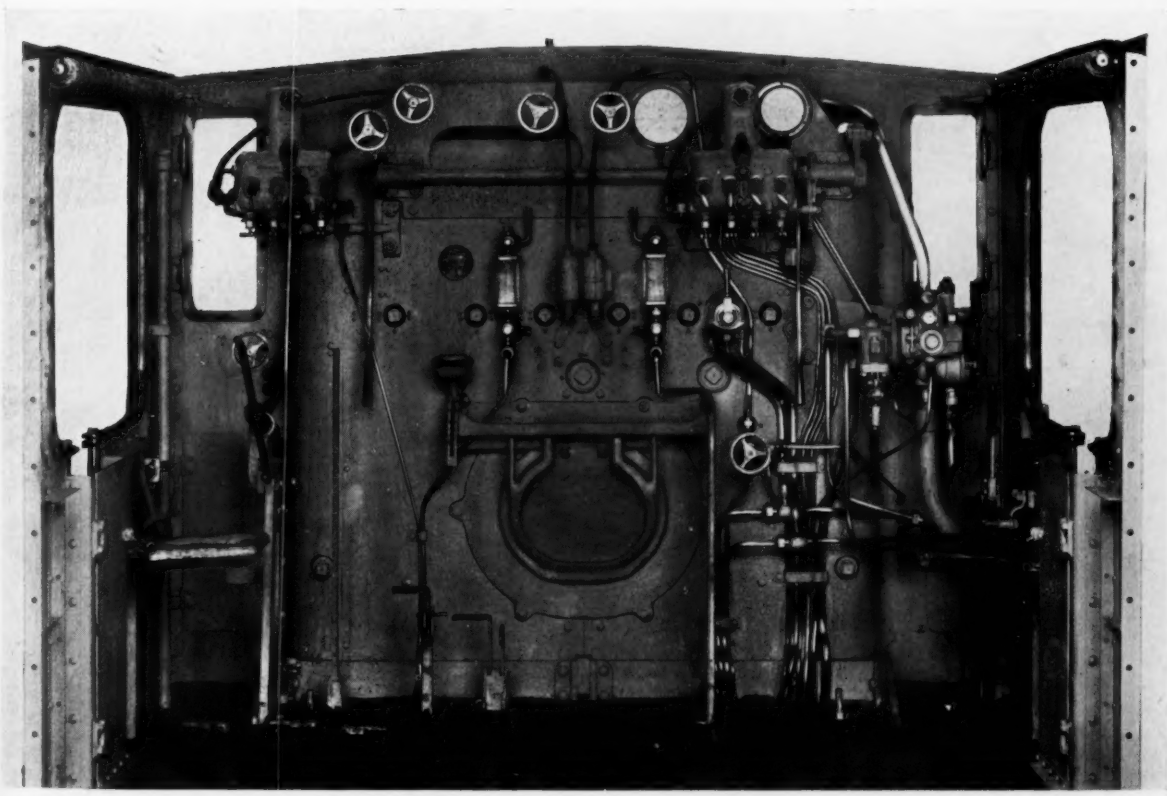
The engines will be capable of a maximum speed of 50 m.p.h., but speed over the Jebba-Minna section is at present severely restricted. However, owing to the ease of the Beyer-Garratt locomotive on the track, it is hoped in due course to effect improvements in timings. The principal gradient throughout the Western main line is 1 in 80, but small portions of steeper grade up to 1 in 60 exist. The engines will be exclusively used on the Jebba-Minna section during the heavy export seasons,



4-8-2 type locomotive of the 700 class, Nigerian Railway, used on 55-lb. and 60-lb. rail sections



Near view of forward engine group, Nigerian Railway 4-6-2 + 2-6-4 *Beyer-Garratt locomotive*



Interior of cab, showing controls and fittings

which continue for six months. During the other six months it is intended to put them on through running from Lagos to Kano, a distance of 700 miles, with passenger trains, when they will be able to run at speeds up to 40 m.p.h. over the 215 miles of 80-lb. track section.

The new locomotives are a substantial advance over the present largest type of engine now working on the Jebba-Minna section, namely, the 4-8-0 type with a tractive effort of 23,706 lb., and have a 4 ft. coupled wheel as against one of 3 ft. 6¾ in.

The Nigerian Railway names its locomotives, and the four Beyer-Garratts under note have been called after Nigerian Chiefs, as follow :—

501 *Sultan of Sokoto*
502 *Emir of Katsina*
503 *Shehu of Bornu*
504 *Emir of Gwandu*

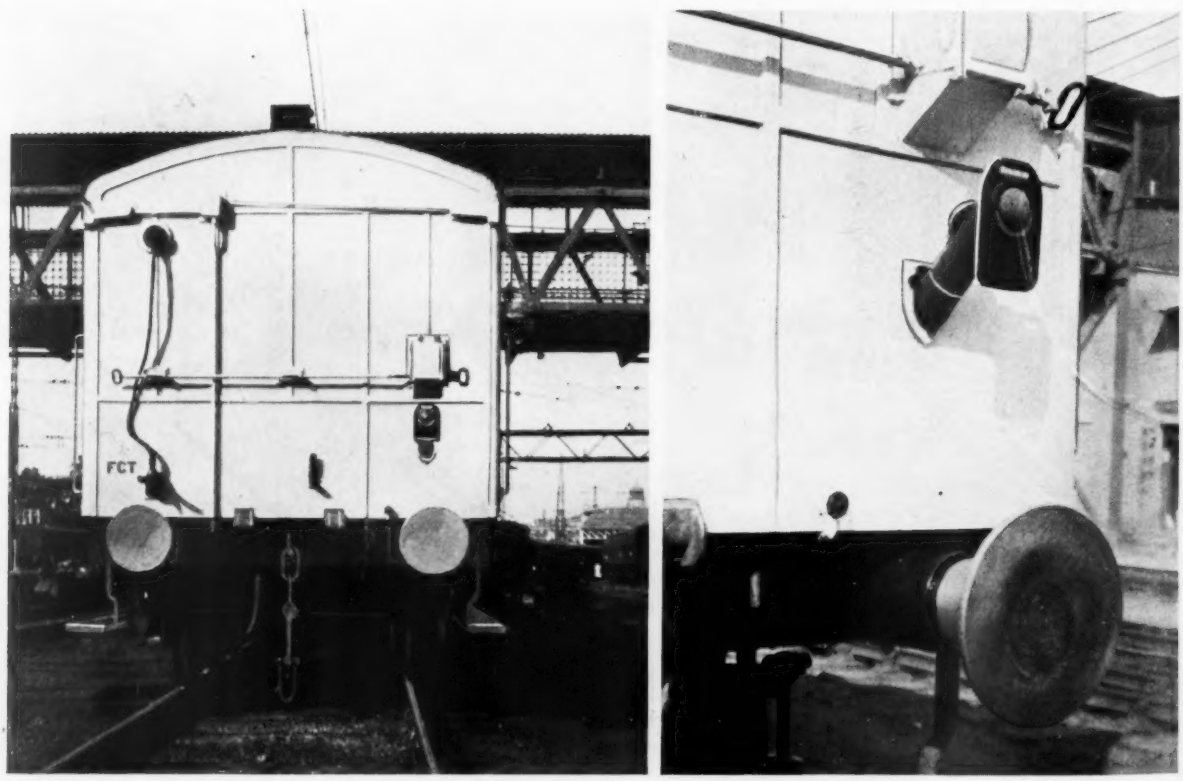
The locomotives, which have been shipped in three parts, will be painted in L.M.S. red on arrival in Nigeria, this being the standard colour of the Nigerian Railway.

From the care which has been expended on detail by the Nigerian authorities and the Crown Agents for the Colonies, under whose supervision and inspection they have been constructed, and the stage of development to which the Beyer-Garratt has been advanced in recent years by the builders, the success of these engines seems a foregone conclusion. Further, from recent published results of the performance of this type of articulated engine, particularly on light rails, such as on the 50-lb. rail, where mileages up to 7,000 a month have been run and maintenance expenses per unit of power brought below that of the ordinary type, it seems established that substantial improvements and economies in light rail operation can be assured where capital expenditure places relaying out of the question.

The overall and certain other proportional details omitted from the above description are obtainable from the drawing on page 245.

Portable Electric Tail Lamps

The Great Indian Peninsula Railway has recently developed an interesting type of electric tail lamp for use on coaching stock wired on the parallel block system. The device consists of a two-point plug enclosed in an aluminium housing designed to fit into the standard Kent coupler socket, and to register with the lighting positive and negative contacts of the same. The electric bulb fitted in a suitable aluminium case is located on top of the housing containing the plug and provided with a branch fuse fitted in the base. The lamp possesses the advantages of being automatically controlled with the train lights, and is interchangeable with other coaching vehicles, without having to resort to the use of special fittings or flexible connections. It is considered that this type of electric tail lamp should supply a long-felt want on Indian railways.



Two views of the electric portable tail lamp as applied to the Kent coupler socket of a G.I.P.R. coach

THE CANTON-HANKOW RAILWAY

A description of the construction work, permanent way, and rolling stock, and a note on prospective traffic

A BRIEF note in explanation of several illustrations of the Canton-Hankow Railway construction works was published in THE RAILWAY GAZETTE of March 9, 1934, and this subject was again referred to in our editorial on page 706 in the issue of November 1 last. Now, however, we have received from Messrs. Sandberg, the Consulting Engineers, a paper by Mr. H. H. Ling, Director and Engineer-in-Chief of the construction, which embodies a fuller description of it. We are also indebted to them for the illustrations, which give a good idea of the country traversed and the work entailed.

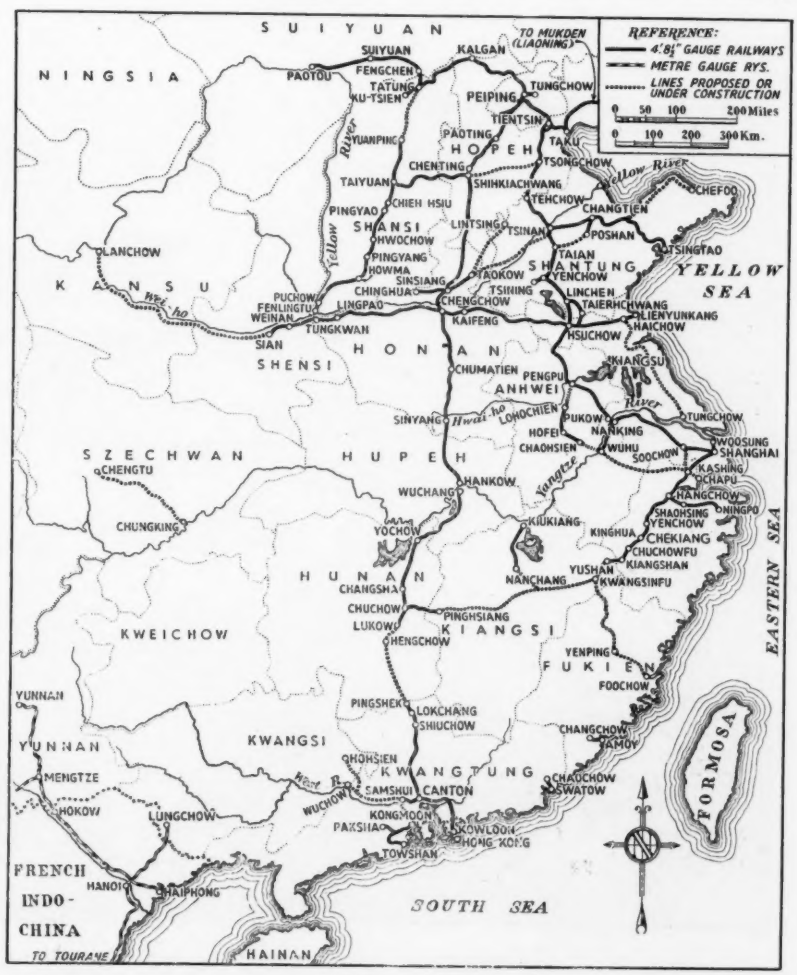
The construction of the 406 km. (252 miles) of line remaining to complete the through south-north route, begun in the autumn of 1933, was divided into six divisions, varying in length according to the heaviness of the work entailed, and each was divided into three or four subdivisions. Each division also had a medical and a police officer. Transport offices were established in Canton and Wuchang and store depots at Chuchow, Hengchow and Lokchang. Early last year as many as 100,000 men were employed at a time.

Probably the most difficult part of the uncompleted 252-mile section is the one-third of that distance from Lokchang to Chenchow across the divide that separates Hunan from Kwantung. Work there is very heavy and necessitates many rock cuttings, much tunnelling and the construction of a number of high viaducts and extensive retaining walls. The original location of this section was carried out by British engineers of the Yueh Han (Canton-Hankow) Railway Company, and included some 66 tunnels. Further survey work has, however, enabled that alignment to be improved and tunnelling reduced to a total number of only 14, the longest of which is 300 m. The ruling gradient is 1 in 100 uncompensated for curvature, equivalent to about 1 in 80 compensated.

The rock formation is composed mainly of good limestone, either exposed or covered with a few feet of earth. Most of the rock cutting work has been carried out with compressed air drills and dynamite blasting. Owing, however, to the very steep mountain slopes down into the river bed, only the lightest forms of air compressors could be used, and in many instances they had to be mounted on country boats, as this was the only way to move them up and down the river as required. The total quantity of rock cutting of this difficult section amounts to about 3,000,000 cu. m. The most suitable form of bridging has proved to be reinforced concrete arches or steel girder spans on masonry piers.

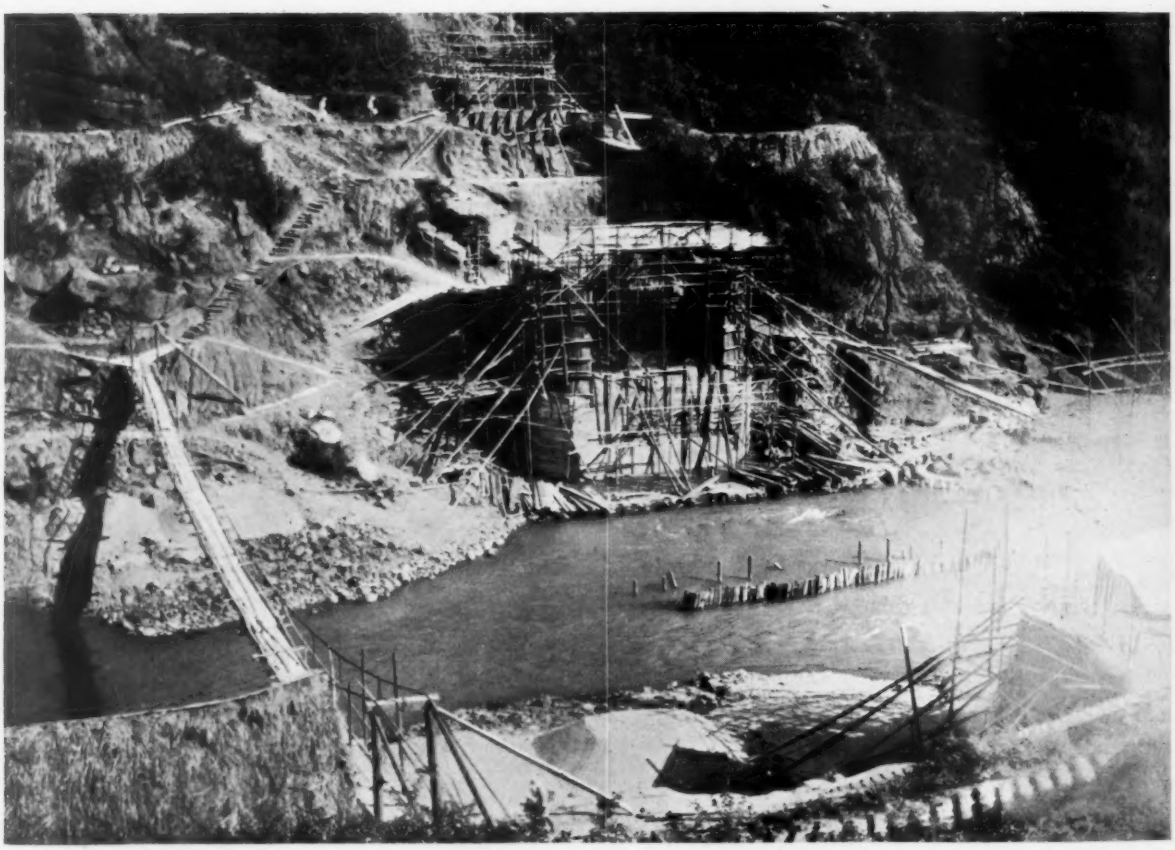
which are sometimes as much as 120 ft. in height. The greatest difficulty from the engineer's point of view on this 120-km. section of construction has been that of transport, as the North River, which the alignment follows, runs in deep gorges through mountain ranges, and there are only broken footpaths here and there on the steep hillsides, close to the river. The even flow of the latter, too, is interrupted by no fewer than 18 sets of rapids, so that it is not easily navigable. On the north side of the divide, that is to say in Hunan, there is no river that can be followed and the transportation of men and materials along the water courses and footpaths in very broken country has been exceedingly difficult. As a result, the cost of transport on a barrel of cement has frequently been greater than the cost of the cement itself.

On the northern section from Chuchow to Hengchow, a distance of 130 km., the line traverses rolling country, necessitating only one other tunnel and little rock cutting



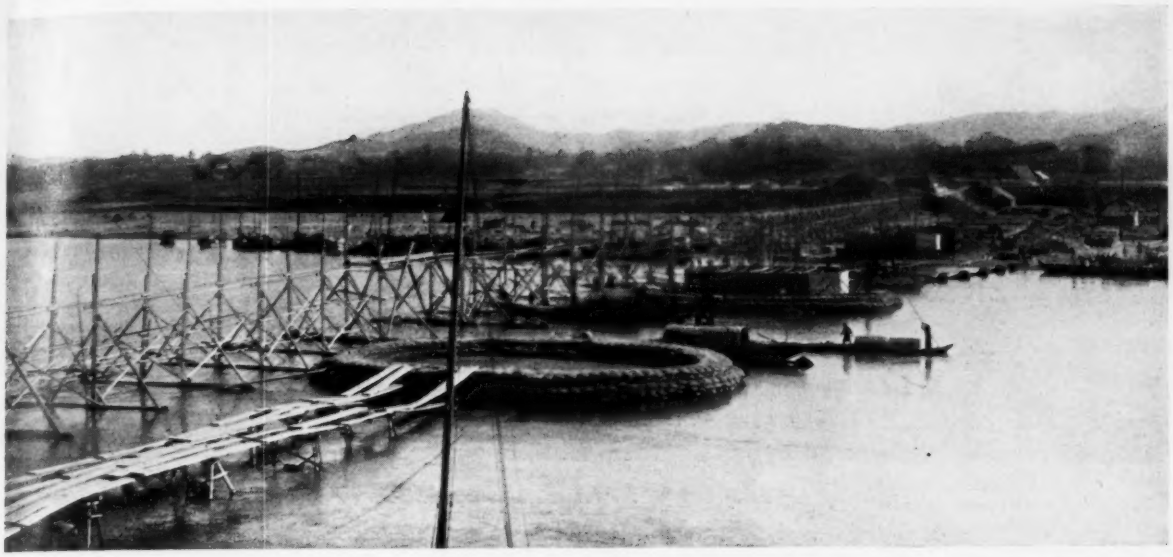
Sketch map showing Canton-Hankow and connected railways, and (dotted) the Lokchang-Lukow section under construction

Typical length of hill- and river-side construction work with alternating cutting and retaining wall on steep slopes into river bed



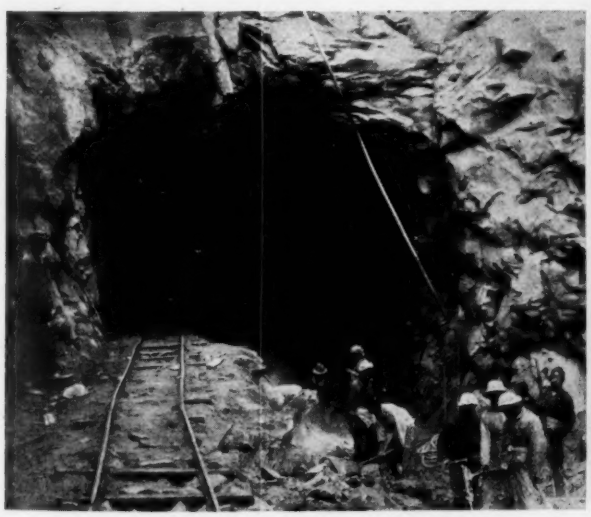
Construction work in progress upon a lofty bridge spanning a gorge

THE CANTON-HANKOW



Foundations of a major bridge in course of construction when the river is low: note the sand-bag cofferdams or ring-bunds

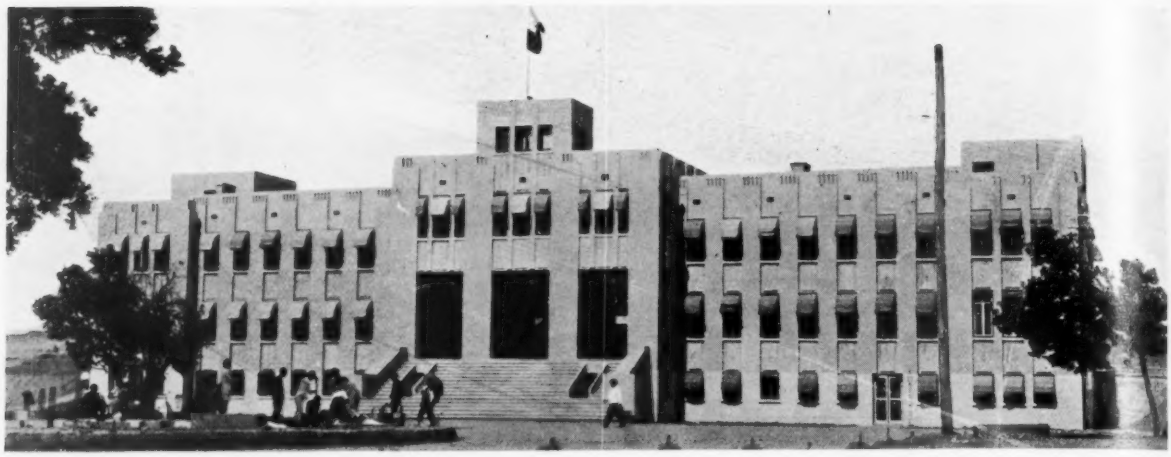
Major bridge completed except for girder erection, after the river has risen. The girders consist of decked 59-ft. and through truss larger (158-ft. or 197-ft.) spans



Tunnelling with air compressor plant

Portal of one of the many tunnels completed

RAILWAY CONSTRUCTION



Imposing façade of one of the larger stations, Hengchow (see map)

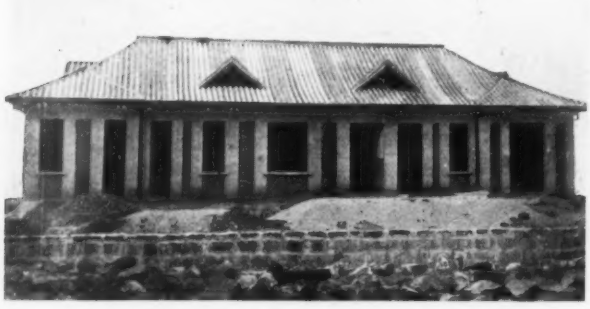
or retaining walling. There are, however, three major bridges. Over the Lo Ho is a bridge consisting of four spans, each of 45 m. in length, the girders being of the through truss type, and seven 18-m. deck girder spans. The second bridge, over the Mi Ho, consists of two 45 m. through truss spans and 14 18-m. deck girder spans. The Lei Ho bridge consists of four 60-m. through truss spans and eight 18-m. deck spans. Work on these bridges was started in October, 1934, and the piers of the Mei Ho bridge, which rest on rock foundations, were completed early in 1935, but at the other two bridges caissons had to be sunk and a large number of piles driven. Owing to abnormal floods these bridges were not expected to be completed before the end of 1935.

Permanent Way

The permanent way used is Chinese National standard 85-lb. a yard material, rails 40 ft. in length. At least two loop lines are provided at each station, their minimum effective length being 1,476 ft. Sleepers are either of treated Douglas fir, 6 in. × 9 in. × 8 ft., of Jarrah or Australian hard wood, 5 in. × 9 in. × 8 ft., or of local Hunan pine or fir, 6 in. × 8 in. × 8 ft. Sixteen sleepers are laid in each 40-ft. rail length. The standard Chinese practice of staggering the rail joints has been adopted.

Rolling Stock

The type of locomotive to be used on the Canton-Hankow for some time to come, is the very fine 4-8-4 described and illustrated in THE RAILWAY GAZETTE of November 1. It is expected to haul 1,000 metric tons up the 1 in 100 grades at 15½ m.p.h. The wagon stock will be of standard Chinese all-steel types, either covered, high-sided or flat, the capacity in all cases being 40 tons. Tientsin-Pukow Railway pattern passenger stock is being provided.



Typical wayside station building

Quantities of Materials Used

Mention has already been made of the difficulties of transport. The materials that had to be carried totalled, 50,000 tons of rails and fittings, 6,000 tons of steelwork for bridges, 670,000 sleepers, 525,000 barrels of cement and several thousand tons of miscellaneous steelwork as well as tools and plant of all kinds. About two-thirds of the materials were brought up the Lei River from the north, as far as Chenchow in small junks, about 300 of these being in use at one time.

Progress of the Work

Up to the end of September, 1935, the progress of the work was represented by the following percentages.

	Percentage completed
Earthwork	91
Tunnelling	83
Retaining walls	100
Major bridges	72
Minor bridges and culverts	89
Station buildings	22
Platelaying	50

Traffic Prospects

In spite of inadequate transport facilities Hunan already exports—mainly from Pinghsiang—by rail to Wuchang some 1,000,000 tons of coal annually. More will in future be carried southwards over the new line to Canton and Hong Kong. This rich province also exports, via Wuchang, wood oil valued at $15,000,000 a year. Much of this too—which is about 40 per cent. of the exports of the province—will in future go to Canton. A further 23 per cent. consists of minerals, including antimony, but, due to lack of transport, the large quantities known to exist have so far hardly been touched. Large quantities of imports from Hong Kong and Canton will also use the new direct route to central China, once this line is open. Passengers too, will be carried from Hankow to Canton in about 32 hours, instead of from 10 to 15 days via Shanghai. The new railway is therefore expected to be worked to capacity almost as soon as it is opened for public traffic.

THE NIDD VALLEY LIGHT RAILWAY

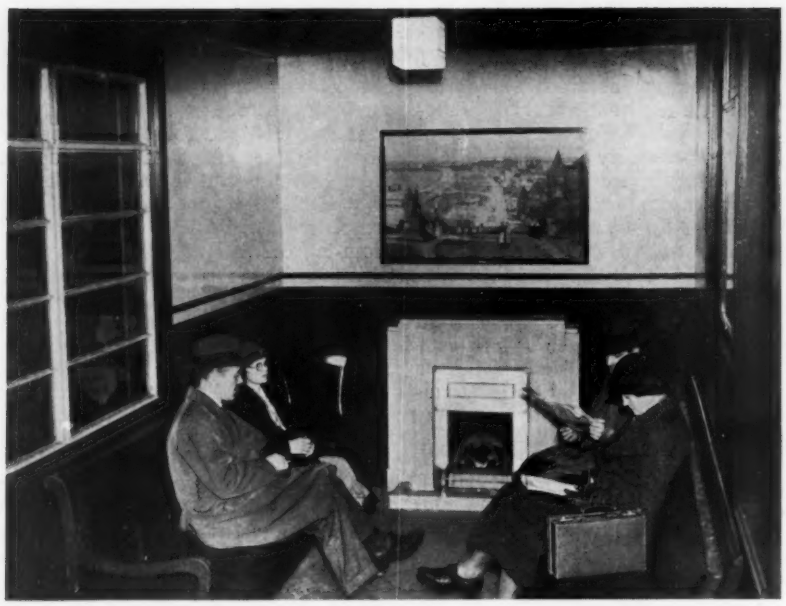
IN 1890 the Bradford Corporation obtained Parliamentary powers to construct certain waterworks in Nidderdale. The work involved the construction of several impounding reservoirs with the necessary aqueducts to take the water to Bradford and was expected to be spread over many years. The Gouthwaite compensation reservoir was built in 1893-1900 and the Nidd aqueduct largely in the same period, but from a public works point of view, these were not too far distant from what is now the L.N.E.R. main line. The reservoirs remaining to be built were situate, however, in much more inaccessible places and the question of transport of materials presented a serious problem. The L.N.E.R. had its Nidd Valley terminus at Pateley Bridge but the valley was inhabited agriculturally for a distance of 6 miles higher up and there were the villages of Wath, Ramsgill, Lofthouse, and Middlesmoor on this stretch, or reasonably near it.

The Bradford Corporation therefore promoted a Bill and obtained powers to construct a standard gauge railway from Pateley Bridge to Lofthouse and this work was carried through in 1900-1903. Under a Light Railway Order of 1904, the line was open for public passenger and goods transport on September 11, 1907.

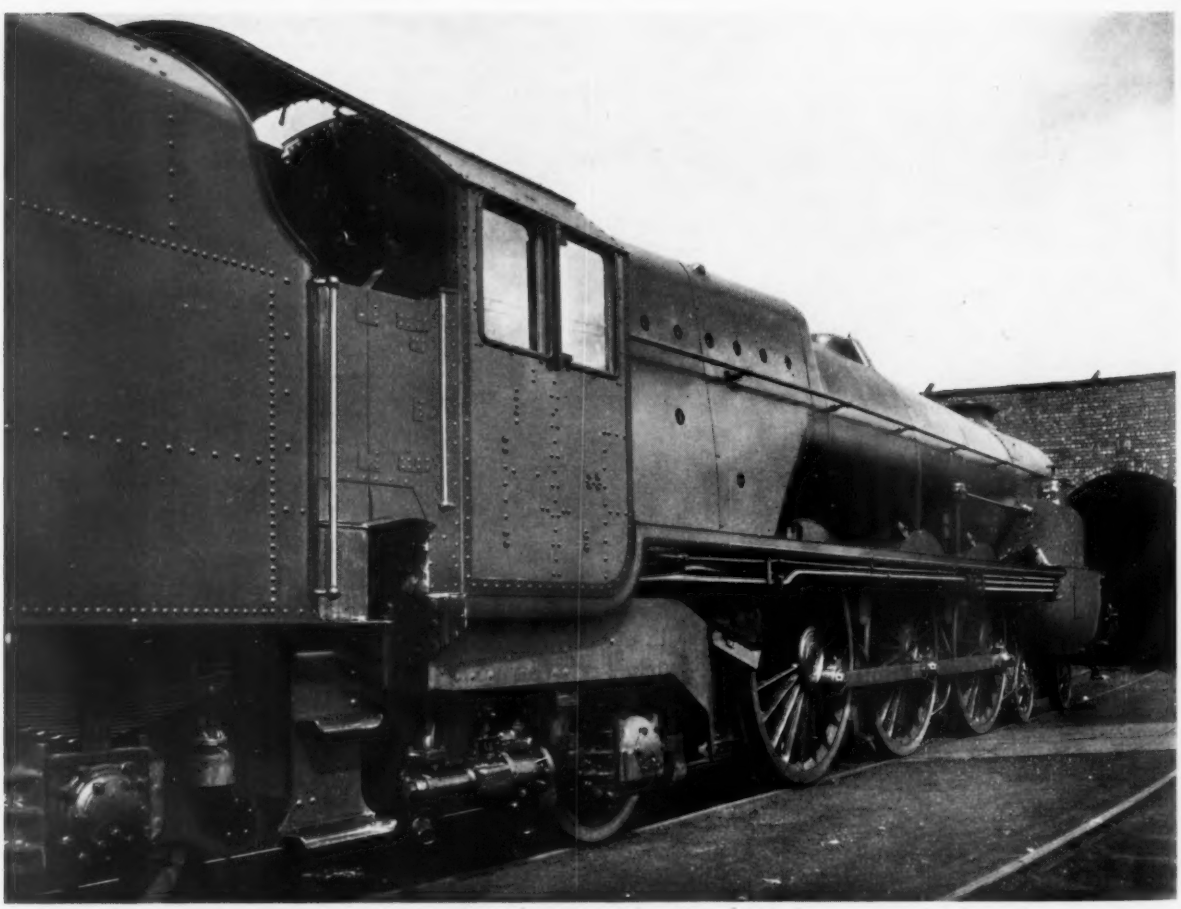
From Lofthouse to Angram, which lies at the bottom of Great Whernside—an outstanding peak of the Pennine Range—and which was the site of the next reservoir to be built, there was no road which could be considered even as a transport route for the new work. The Corporation therefore built a new road up the floor of the valley from Lofthouse to Angram (4 miles) and, having made it wide enough to admit of this, laid a standard gauge railway line on one side of it. A connection had been made from the L.N.E.R. to the Nidd Valley Railway at Pateley Bridge and with the completion of the road from Lofthouse to Angram main line railway wagons were available on the site of the new reservoir at 1,200 ft. above sea level.

Angram reservoir was built during the period 1903 to 1916, but the war prevented the construction of Scar House reservoir when intended; this work began in 1921 and is now all but completed. By 1929 passenger traffic on the Nidd Valley Light Railway was so adversely affected by the competition of bus services that on December 31 of that year the Bradford Corporation closed it to the public, but continued to use it in connection with the works at Scar Dam. Now that it has served its purpose in connection with the waterworks, the rails and sleepers will be lifted and sold when the plant has been disposed of, but several months will be occupied in doing this. We are indebted to Mr. William Newlands, Waterworks Engineer, Bradford Corporation, for many of these details.

View at Scar Dam showing accommodation lines on the waterworks site. The "main" line of the Bradford Corporation Nidd Valley Light Railway may be seen on the right-hand side of the valley, with telephone poles alongside, passing in front of, but below, the houses of Scar village which was built for the accommodation of workmen



New waiting room on Platform A at Waterloo (South Eastern side). We refer to this in an editorial note on page 229



View of L.M.S.R. turbine locomotive from rear end, showing Timken roller bearing axleboxes of trailing engine, and leading tender wheels. *(See article on page 262)*

RAILWAY NEWS SECTION

PERSONAL

At a meeting of the Council of the Institution of Mechanical Engineers, held on January 31, Mr. H. N. Gresley, Chief Mechanical Engineer, London & North Eastern Railway, was nominated President-elect of the institution for the forthcoming official year.

Mr. William Orr Leitch, M.Inst.C.E., has recently retired from the position

Mr. W. O. Leitch,

Chief Engineer and General Manager, Peking-Mukden (or Peiping-Liaoning) Railway, 1928- and 1933–35

of General Manager and Chief Engineer of the Peking-Mukden (or Peiping-Liaoning) Railway, after 38 years' service on railways in North China. He was appointed an Assistant Engineer on the Imperial Railways of North China in 1897 and gained experience on the Fengtai-Paotingfu and Newchwang-Hsin Min constructions until the Boxer outbreak in 1900. Afterwards he was engaged in repairing railways that had been destroyed and upon other works until, in 1918, he was appointed District Engineer at Shanhaikuan in charge of the part of the P.-M.R. beyond the Great Wall, and of construction works such as the Peipiao branch, in hilly country. After further trying experiences of rebellions and wars in that area, he was at length transferred to headquarters as Chief Assistant Engineer in 1926, and was promoted to be Chief Engineer two years later. In 1933 Mr. Leitch was additionally appointed General Manager, the line then terminating at the Great Wall so far as China was concerned, but still being of considerable importance as a link in the chain between China, Manchukuo, and the U.S.S.R. Prior to his leaving Tientsin, he was entertained to dinner by a remarkable international gathering of fellow engineers, a great tribute to Mr. Leitch. He became a member of the Institution of Civil Engineers in 1906.

From the *London Gazette* of January 24: Regular Army, Supplementary Reserve of Officers: Royal Engineers, Transportation—Lt. Col. H. A. Short, M.C., to be Brevet Colonel (July 22, 1935). Colonel Short is the Road Transport Liaison Officer of the Southern Railway, and represents it on the boards of several associated road companies.

The directors of the London Midland & Scottish Railway Company have appointed Sir Robert Bruce, LL.D., to be a Member of the Scottish Local Committee of the company. Sir Robert, who is in the twentieth year of his editorship of the *Glasgow Herald*, has had a distinguished journalistic career, his association with that newspaper dating from the year 1898, when he became a member of the Parliamentary staff. Since then he has been successively London Editor, Assistant Editor, and Editor, from which position he is shortly to retire. He is an LL.D. of the Universities of Glasgow, St. Andrews and Toronto, and a Deputy Lieutenant of the City of Glasgow: he has a remarkably wide knowledge of all Scottish affairs. In 1926 he was President of the Institute of Journalists.

Captain E. E. Tedford has been appointed General Manager, Canadian National Steamships and Canadian Government Merchant Marine. Capt. Tedford was born in Nova Scotia and graduated from the Nautical Academy in 1896, securing a Master's Certificate. After serving under the British Ministry of Shipping from 1917, he joined the Canadian Government Merchant Marine in 1920 as Marine Superintendent at Montreal, and was appointed General Superintendent of Marine upon the formation of Canadian National Steamships. He has been acting as General Manager since March last.

Mr. L. M. Sharp, who, as recorded in our issue of January 31, has been appointed Superintendent Engineer, Chief Docks Manager's office, Cardiff, G.W.R., joined that railway as an apprentice in the marine factory at Fishguard in 1909. From 1914 to 1919 he served with the Royal Engineers in France and Belgium, and was awarded the D.C.M. in 1916. From 1919 to 1926 he was employed as an engineer in various capacities in G.W.R. steamers, and was appointed Assistant Marine Engineer, Fishguard, in the latter year. In 1927 Mr. Sharp was transferred to Cardiff as Assistant Marine Engineer, Chief Docks Manager's office, the position from which he is now promoted to be Superintendent Engineer.

Dr. Stephen Mayer, who, as announced in our issue of January 24,

Dr. S. Mayer,

Manager in London, Austrian Federal Railways, and Director, Austrian State Travel Bureau, 1926–36

has been recalled to Vienna from London, has been appointed a Director of the Austrian State Tourist Department. After taking degrees in Law and Economics, he entered the service of the Austrian Federal Railways, but was soon transferred to the Ministry of Trade and Transport—which included work in the Civil Aviation Department. He rejoined the railways in 1923, and in the following year was sent to England to study and report on British railways: his report earned favourable comment from the late Sir William Acworth. He came to England again in 1926 to open a small office in Cockspur Street to popularise Austrian travel, and, so rapidly did he succeed, that he soon had to move into larger premises in Lower Regent Street, and, more recently, into the present commodious offices of the travel bureau at 159, Regent Street. His success is also reflected in the greatly increased volume of British tourists to Austria, which has become a popular holiday resort. His promotion as a Director of his department in Vienna is, therefore, well merited, and we join his many friends in London in congratulating him

upon it, though at the same time we regret his leaving England

At the monthly meeting of the Committee of the Irish Railway Clearing House, held on January 29, Sir Walter Nugent, Bart., was unanimously re-elected Chairman for the year 1936.

Mr. J. F. Arthur, who, as announced in THE RAILWAY GAZETTE of January 31, has been appointed Dock Mechanical Engineer, Cardiff, G.W.R., served his apprenticeship at the engineering works of the Cardiff Railway from 1903 until 1908, and continued as a

Mr. J. F. Arthur,
Appointed Dock Mechanical Engineer, Cardiff, G.W.R.

draughtsman there during the two following years. From 1910 to 1915 he was employed as Draughtsman and Assistant Engineer on the Grand Trunk Pacific and National Transcontinental Railways, first at Winnipeg and later at Ottawa in Canada. Returning to Wales, Mr. Arthur was appointed Draughtsman of the Cardiff Railway in the latter year, becoming Assistant Engineer in 1919, and later Chief Assistant Mechanical Engineer. When the Cardiff Railway was absorbed in the Great Western system in 1922, he was appointed Assistant Dock Mechanical Engineer, G.W.R., the post from which he is now promoted to Dock Mechanical Engineer. Mr. Arthur is a Member of the Institution of Mechanical Engineers.

Mr. A. R. Guinness, of Guinness, Mahon & Company, bankers, 53, Cornhill, E.C.3, has been appointed to succeed the late Sir Basil Blackett as Treasurer of the Chinese Government Purchasing Commission, 21, Tothill Street, S.W.1.

It is with regret that we note the death, on January 11, of Mr. Robert Gilmour, who retired in 1924 after 22 years' service as Stationmaster, St. Enoch, Glasgow, L.M.S.R., and 48 years' service on the Glasgow & South Western and L.M.S. Railways.

Sir M. Webster Jenkinson, K.B.E., F.C.A., a Director of the various Vickers associated undertakings, whose death we announced in our issue of November 8, left estate valued at £10,908 (£6,458 net).

We regret to note the recent death, in Sydney, of Mr. G. A. Hobler, who was Chief Engineer of the Commonwealth Railways during the time the Trans-Australian Railway was built. Prior to 1913 he was on the staff of the Queensland Government Railways.

Mr. Joseph Maudslay, M.I.Mech.E., late Assistant General Manager of the Egyptian State Railways, now associated with Davey Paxman & Co. (Colchester) Ltd., has accepted a seat on the board of A. & J. Main & Co. Ltd., constructional engineers, Glasgow and London.

Mr. Basil Heastie, M.Inst.C.E., M.I.Chem.E., has joined the board of Asbestos & Engineering Products Limited, of Winchester House, Old Broad Street, London, E.C.2, where his considerable experience in the design of plant for chemical and allied industries will be available to the company's friends and associates.

Mr. F. A. Bottomley, Secretary of the Local Boards of the Entre Rios, Argentine North Eastern, and Argentine Transandine Railways, returned to Buenos Aires towards the end of December from leave in England.

Mr. P. R. Rau, Financial Commissioner of Indian Railways, has now returned from leave spent in China and Japan, and resumed his duties on January 6.

INDIAN RAILWAY STAFF CHANGES

Mr. P. Wood has been appointed to officiate as Chief Accounts Officer, G.I.P.R., as from December 11.

Mr. W. T. Griffiths has been appointed to officiate as Deputy Agent (Staff), G.I.P.R., as from December 11.

Mr. Rangbihari Lal has been appointed to officiate as Deputy Controller of Railway Accounts as from December 24.

Mr. F. C. Sheldon, late Senior Locomotive Running Inspector, G.W.R., whose sudden death we announced in our issue of January 24, entered the company's service 46 years ago as an engine cleaner, became a fireman in 1890, and in 1898 was promoted to driver. He was appointed Locomotive Running Inspector in 1908, and became Senior Inspector in 1932. During his career Mr. Sheldon made many interesting runs on various footplates, including that of No. 5006 *Tregenna Castle* on June 6, 1932, when it hauled the Cheltenham Flyer over the 77·3 miles between Swindon and Paddington, start to stop, in the record time of 56 min. 47 sec. Later when, in connection with the maiden voyage of the ss. *Normandie*, the mail train from Plymouth to London set up a new record for that journey, he was again on the engine, as he was also on the inaugural run of the Bristolian.

Mr. A. Lane, who, as announced in THE RAILWAY GAZETTE of January 31, has been appointed Assistant Chief of

Mr. A. Lane,
Appointed Assistant Chief of Police, G.W.R.

Police, Paddington, G.W.R., joined that railway in 1903, and was posted to the Police Department in 1911: later he was appointed Detective Inspector at Paddington. During the war he was attached to the Provost Marshal's organisation at G.H.Q., Montreuil-sur-Mer, and detailed for criminal investigation work in the lines of communication area and northern railheads in the Department Pas de Calais. In close co-operation with the French police he obtained an intimate insight into their methods, and was responsible for bringing two murderers to justice: he was awarded the Meritorious Service Medal for his services with the Armies in France and Flanders. After the Armistice also, he was for a short time at Solingen in the Rhineland. In 1920 Mr. Lane joined the staff of the Solicitor to the G.W.R., and from that time until his present appointment he was attached to the Common Law and Prosecution Department, with the duty of investigating matters likely to involve litigation, preparing and attending civil actions on trial, and attending criminal cases before the Courts of Assize or Quarter Sessions. He has also prepared the evidence of the matters heard before the Standing Arbitrator, appointed by

the Lord Chancellor under the Third Schedule of the Railways Act, 1921.

Mr. F. R. Chislett, late Chairman, British Wagon Co. Ltd., left estate valued at £38,656 (£37,128 net).

Lt.-Col. T. Gracey, R.E. (retd.), Chairman, Bengal & North Western Railway, arrived in India at the beginning of January and will be in the country for a period of about 2½ months.

The Chinese Minister of Railways has appointed Mr. Chen Cho-sun to be Managing Director, and Mr. Hsu Cheng-au to be Assistant Managing Director of the Peiping-Mukden Railway.

Monsieur Japiot, Assistant Chief Mechanical Engineer, has been appointed Chief Mechanical Engineer, Paris, Lyons & Mediterranean Railway, in succession to M. Vallantin, whose retirement, on January 1, we recorded in THE RAILWAY GAZETTE of January 17.

We regret to record the death, in Buenos Aires, on January 10, of Mr. Edmund Hay Currie, Sectional and Survey Engineer of the Buenos Ayres & Pacific Railway. He was born at Nice in 1877, and joined the B.A. & P.R. in 1907. He saw active service in the South African War, and also in the Great War, holding the rank of Captain in the Royal Engineers.

From the *London Gazette* of February 4: Regular Army: Col. L. Manton, D.S.O., O.B.E., has been appointed Chief Engineer, Malta (January 19). Col. Manton is well known to railwaymen as former Commandant of the Railway Training Centre at Longmoor. He was also in the Traffic Department of the Indian State Railways before the war.

RAILWAY PURCHASING COMMISSION IN CHINA

The Purchasing Commission of the Chinese Ministry of Railways has been re-organised, and is now constituted as follows:—

Mr. Tseng Yang-fu, Political Vice-Minister of Railways, as Chairman of the Commission.

Messrs. Li Fa-tuan, Chen Pi-lin and Chu Wen-hsiung, Hsia Kwang-yu, Pan Kwang-chiung and Mo Heng, members.

Mr. Chen Pi-lin has been appointed concurrently Director of the Shanghai Office of the Commission, with Mr. Su Lo-chen as Vice-Director.

Mr. Li Fa-tuan will also be Chief of the General Affairs Section of the Commission; Mr. Mo Heng, Chief of the Audit Section; Mr. Chu Wen-hsiung, Inspecting Chief of the Section; and Mr. Kwan Hsi-lin, Chief of the Railway Material Funds Section.

Mr. Tseng Yung-pu (T. K. Tseng), Administrative Vice-Minister of Railways, and Messrs. Hsieh Feng-tao and Chang Ching-li have been appointed members of the Custody Committee for Railway Material Funds.

G.W.R. Chief Accountant's Luncheon to his Paddington Supervisory Staff

Sir Ralph Cope, Chief Accountant, G.W.R., entertained the members of his Paddington Supervisory Staff to a luncheon at the Great Western Royal Hotel, Paddington, on January 24, on the occasion of his completion of 59 years' service with the company, and in celebration of the knighthood conferred upon him by the late King in the New Year Honours.

Sir Ralph Cope, in welcoming his guests, expressed his regret that it had been necessary to adhere to the date originally fixed for the luncheon, which fell within the period of mourning for His late Majesty, King George V.

Mr. T. B. Cox, Assistant Accountant, who proposed the health of Sir Ralph Cope, said that his long service might be claimed as a record not only for a chief officer of the G.W.R., but of any British railway, and even of any railway in the world. Although the whole of his supervisory staff was there assembled, only four of its members had been born when he entered the company's service, and took his first steps along the path leading to the goal of Chief Accountantship.

His gifts of keen judgment and marvellous memory, allied with his deep understanding of the history and traditions of the Great Western Railway, had enabled him, in his capacity as Chief Accountant and Financial Adviser to the company, to render most valuable service during the critical times which British railways had been and were still enduring. He had had the honour of being installed as Acting General Manager during the General Manager's absence in 1934; it was a further compliment to him when a member of his department, Mr. C. R. Dashwood, then Assistant Accountant, was chosen as Assistant General Manager.

His services were widely sought and freely given in solving difficult accountancy problems arising between the British railways. He had borne the onerous duty of formulating the plan on which was founded the London Passenger Transport Pool, a task requiring all his qualities of tact and infinite patience. The honour of knighthood recently conferred upon him had given the greatest delight to his staff, and to his many friends inside and outside the railway service. He was the first railway accountant to be so honoured, and might quite well add to his other records by remaining as the only one with this distinction.

Mr. C. R. Dashwood, Assistant General Manager, said he had been fortunate in working in close association with Sir Ralph Cope for 20 years. Sir Ralph had come to be the corner stone of the great undertaking he served; but his services were not only in one direction, and the other railways were delighted at the recognition in the shape of a knighthood accorded to his valuable work in matters of finance affecting the general interest. His own staff delighted in the good fortune of being associated with him as a friend and as a man.

Mr. W. R. S. Morris said he wished to congratulate Sir Ralph Cope as a representative of the lesser lights in the firmament of his office, and wished to be associated with the sentiments of the greater luminaries who had preceded him. Sir Ralph Cope had achieved fame in all walks of life—at bowls, at chess, at cricket, at football, and perhaps in a lesser degree at golf. With all these achievements, he had attained the respect and affection of those who worked with him.

Sir Ralph Cope responded to the toast, and later, on leaving the gathering was accorded a spontaneous ovation inspired by the sincere attachment and esteem of his staff.

Forthcoming Events

Feb. 8 (*Sat.*).—Stephenson Locomotive Society (Midland and Northern), at 4, Bury Old Road, Cheetham Hill, Manchester, 6.30 p.m. "Locomotives which have not Fulfilled Expectations," by Mr. J. Maskelyne.

Feb. 10 (*Mon.*).—Institute of Transport (London), at Inst. of Electrical Engineers, Savoy Place, W.C.2, 5.30 p.m. "The Future of Port Control, with Special Reference to the Possibilities of Grouping," by Sir David J. Owen.

Stephenson Locomotive Society (London), at L.N.E.R. Dining Club, King's Cross station, 6.30 p.m. "Locomotive Rosters," by Mr. B. Adkinson.

Feb. 11 (*Tues.*).—Institute of Transport (Birmingham), at Queen's Hotel, 6 p.m. "Air Transport and Civil Aerodromes," by Alderman A. James, J.P.

Permanent Way Institution (Sheffield), at Royal Victoria Hotel, 7 p.m. "The Permanent Way from an Operating Point of View," by Mr. L. Ballan.

Permanent Way Institution (York), at Railway Inst., Queen Street, 6.30 p.m. "Winning Coal and its Effect on the Railways," by Mr. G. Davidson.

Feb. 12 (*Wed.*).—Institution of Heating and Ventilating Engineers (London), at London School of Hygiene, Keppel Street, W.C.1, 2.30 p.m. "Ventilation of the Mersey and other Tunnels," by Prof. J. Haldane.

L.N.E.R. (Cambridge) Lecture and Debating Society, at Railway Social Club, 7 p.m. Debate: "That a Complete Amalgamation of all Forms of Transport is in the Public Interest."

L.N.E.R. (Darlington) Lecture and Debating Society, at North Road Inst., 7.30 p.m. "Problems in Connection with the Duties of a Railway Medical Officer," by Dr. J. McBride.

Permanent Way Institution (London), at Underground Electric Railway Dining Club, Pelham Street, S.W.7, 7 p.m. "How Invention has Influenced Railway Development," by Mr. W. A. Willox.

Feb. 13 (*Thurs.*).—Institute of Fuel, at Chemical Society, Burlington House, Piccadilly, London, W.1, 6 p.m. "The Co-ordination of Fuel and Power Supplies of Great Britain," by Mr. O. Roskill.

Institution of Electrical Engineers, at Grosvenor House, Park Lane, London, W.1, 7 for 7.30 p.m. Annual Dinner.

Institution of Locomotive Engineers (London), at Inst. of Mechanical Engineers, Storey's Gate, S.W.1, 6 p.m. Informal Meeting.

The Railways of South Africa*

The railways of the Union of South Africa serve an area of 472,347 square miles, and the total mileage worked by the administration at the end of March, 1934, amounted to 13,810. At the same date the total number of locomotives was 2,039, representing an aggregate tractive force of 58,661,053 lb., equal to an average of 28,770 lb. each. The passenger stock totalled 3,862 vehicles, including electric motor coaches and trailers, and the number of freight cars in service was 35,301. The Union railway system is one of the largest in the world under one general manager, and is the world's most extensive narrow gauge (3 ft. 6 in.) line.

When it is realised that it is possible to operate a passenger train, complete with dining cars and the usual amenities of modern travel, over a road practically all single line, for a distance of 956 miles, and maintain a mean running speed of 35 m.p.h. on a route including grades of 1 in 50, it will be appreciated that the standard of organisation and technical skill is at a high level. The newest Pacific type passenger locomotives just placed on the line have attained a speed of 70 m.p.h., believed to be the highest ever made on a less than standard gauge railway.

At the end of March, 1934, a route mileage of 13,810, including 680 miles of private railways, was the total actually operated by the Union railways. The track mileage is 15,106, and on the basis of route miles, the following particulars will be interesting:—

Single track mileage	...	12,941·91
Double track mileage	...	222·70
Triple track mileage	...	3·95
Quadruple track mileage	...	11·00
		13,179·56
Sidings, track mileage	...	1,662

The rapid increase in traffic, and more especially in the vicinity of large centres, such as Capetown and Johannesburg, has necessitated improved signalling and point control. The traffic, for instance, in and out of Capetown (Adderley Street), with the intensive electric services over the Simonstown line, and now over the main line to Bellville, is considerable. This has led to the installation of colour-light signals, and electric control of signals and points. Electric power control of signals and points is also in use at Johannesburg main line station. Generally, the usual standard semaphore signals are in use, and at main line stations signals and points are now all interlocked. The new signalling installation round Capetown, and on the Simonstown line, is automatic.

When considering rolling stock, both cars and locomotives, the permissible height and width of vehicles as governed by the loading gauge is important. In respect to running clearances, the South African Railways are very fortunate, so that although naturally limited by a 3 ft. 6 in. gauge, it is still possible to provide adequate passenger accommodation, freight cars of considerable capacity, and powerful locomotives, thanks to the use of large cylinders made possible by the liberal overhang.

Eight-wheeled bogie vehicles are standard for passenger trains, and to a large extent also for freight; all-steel construction is the rule for freight cars, while for passenger equipment steel underframing in combination with wood bodies is used, all-steel construction not having been found suitable. All vehicles have central couplers, and the latest are fitted with automatic couplers. The total number of revenue earning freight vehicles at the end of March, 1934, was 39,881, and of these 18,801 were of the bogie type, running on eight or twelve wheels. Some of these are of exceptional size, as an instance of which may be cited twelve-wheeled cars of the hopper type, having a carrying capacity of about 60 tons (2,240 lb.). In addition, there are numerous examples of eight-wheeled cars of the hopper type, with capacities of 30 and 50 tons.

There has been considerable improvement in the timings between important centres during recent years. The following table gives a comparison between those of 1910 and 1935:—

	1910	
Johannesburg–Capetown	...	35 hr. 45 min.
,, Durban	...	23 ,, 24 ,,
,, East London	...	33 ,, 35 ,,
	1935	
Johannesburg–Capetown	...	28 hr. 28 min.
Durban	...	18 ,, 5 ,,
East London	...	28 ,, 10 ,,

The distances between Johannesburg and Capetown, Durban, and East London are 956, 494, and 665 miles respectively, so that the average speeds at the 1935 schedules are 33·5, 27·3, and 23·6 m.p.h., comparing with 26·8, 21·2, and 19·75 m.p.h.

The most important electrically operated sections of line are the divisions in Natal, where some 305 route miles are now so worked. The overhead system is used, but the line voltage is 3,000 d.c. The locomotives are equipped with four 300-h.p. motors, with a one-hour rating of 1,200 h.p., and a rated tractive effort of 21,200 lb. The maximum working speed is 45 m.p.h. These locomotives have a total weight of 66·7 tons, and run on two four-wheeled trucks, having 4-ft. wheels. Two, and sometimes three, locomotives are required to a train. The following are particulars of the Natal lines now worked by electric traction:—

Pietermaritzburg–Glencoe	...	170 miles.
,, Cato Ridge		30 ,,
Daimana–Harrismith	...	60 ,,
Cato Ridge–Durban	...	45 ,,

The electrification of the Rand lines in the vicinity of Johannesburg will involve the conversion of 74 route miles of track, and a total of 223 track miles; here again the line voltage will be 3,000 d.c. It is expected to have this work completed at the end of 1936.

The development of locomotive power on the several railways which now comprise the Union system has been in the hands of many well-known engineers, and during the last thirty years especially there has been a remarkable increase both in size and capacity, giving ample evidence of the ingenuity displayed by designers and builders alike. In more recent times three and four-cylinder simple engines have been tried, and as might be supposed, the South African Railways, with heavy grades, and, in the past, light tracks and considerable curvature, have made extensive use of many designs of articulated locomotives. These comprise Mallet compounds, Garratts, and modified Fairlie engines of different wheel arrangements. As a general rule engines are assigned to a definite crew, though under certain circumstances, especially in the case of freight trains, more than one crew may be required to work an engine through to the end of its run.

Discussion

Col. F. R. Collins, D.S.O., in the chair, in opening the discussion pointed out that although the South African Railways were less than standard gauge, they provided much of interest and worthy of study to those concerned with standard and larger gauges.

Mr. P. A. Hyde showed a number of slides illustrating what during his superintendency of the Central South African Railway were the standard locomotives in use, and contrasted these engines with those of today.

Mr. W. C. Williams did not quite agree that the 1,000,000 gross tons per track mile per annum had been the deciding factor in the adoption of the 96-lb. rail in South Africa. He thought it was on account of the use of single line against double, the number of crossing loops, the curvature, and the grade, but considered that it might have paid the South African Railways to have doubled the line rather than to have expended so much capital on the 96-lb. rail; the latter was required rather on account of the modern locomotives than the traffic. After remarking upon the successful "GL" class Beyer-Garratt articulated engines, Mr. Williams questioned the author's use of mileages as indications by themselves of locomotive performance.

Mr. J. G. B. Sams spoke of the development of locomotives on sub-standard gauges, mentioning in this connection the very large 2-8-2 locomotives built a few years ago in this country for service on the Kenya & Uganda Railways. He agreed with Mr. Williams' remarks about mileage figures being of very little value. He thought more value would attach to a statement of the fuel consumption for, say 1,000 ton-miles at a certain cruising speed, adjusted to each class.

* Précis of a paper entitled "A Note on the Railways of the Union of South Africa," presented on Thursday, January 30, by Mr. E. C. Poultney, O.B.E., to the Institution of Locomotive Engineers in London.

Centenary of the First London Railway

Today (Friday) completes the first hundred years that London has been served by a passenger railway, and it is therefore interesting to recall the keen excitement of the period. This is understandable when it is realised that the impending opening of a section of the London & Greenwich Railway would give Londoners their first opportunity of riding behind a steam railway locomotive. Many steam road carriages had been tried in the streets of the metropolis; and a steam omnibus service had been run between Paddington and the Bank as early as April 22, 1833, but the steam-operated passenger railway was still to many ordinary Londoners almost a fabulous enterprise, associated chiefly with Liverpool and Manchester.

Proposals for a railway between London and Greenwich first came before the public in September, 1832, when a prospectus was issued by George Walter. The original survey was made by Mr. F. Giles, but Lt.-Col. G. T. Landmann suggested the plan eventually adopted of building the railway on a viaduct of 878 brick arches, and the latter superintended their erection. The railway secured its Act of Incorporation on May 17, 1833 (3 Will. IV cap. 46) as the London & Greenwich Railway Company, but as was perhaps to be expected, the proposed railway was not received with universal enthusiasm as it might be anticipated to disturb vested interests in the coaching and other trades. Some 2,000 persons then travelled daily between London and Greenwich by coach, and in December, 1833, *The Times* said "cads and coachmen are the chief opponents of the Greenwich Railway." The advantages of the line were well set out in a manifesto published in the first issue of the *Greenwich, Woolwich, and Deptford Gazette and West Kent Advertiser* (now *The Kentish Mercury*) which we reproduced on page 587 of our issue of October 27, 1933.

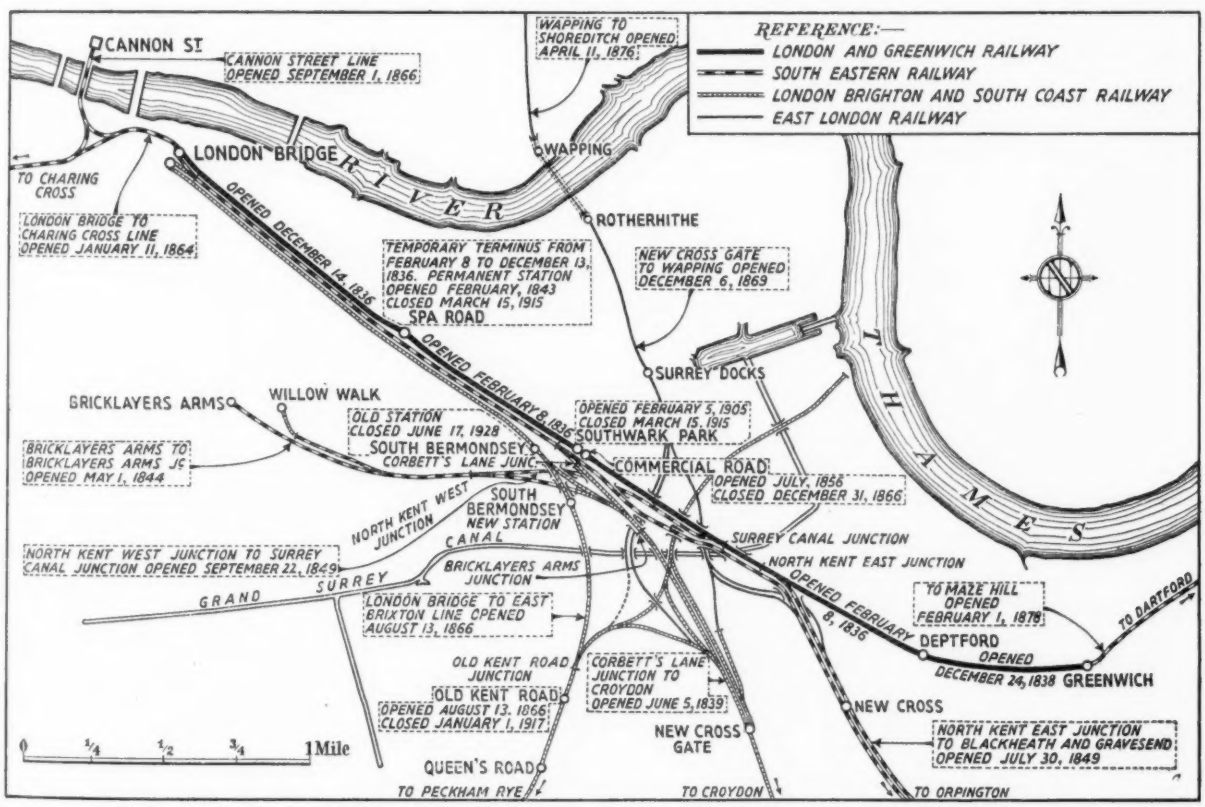
In April, 1834, work was started in open fields between Bermondsey and Deptford, where the first brick was laid. One of the original schemes was to have on each side of the viaduct, at ground level, a tree-shaded carriage and footway enclosed by a low brick wall. A portion of this, described by the press as "incomparably superior to the boulevards of Paris," was the first part of the undertaking completed for revenue earning, as the following shows:—

The number of persons who paid 1d. each to walk on the footpath of the London and Greenwich Railway, on Sunday last, amounted to upwards of 3,000.—*From "The Times" of Thursday, March* 12, 1835.

From this time onward, week after week, the contemporary daily and technical press published articles on, and references to, the progress of the work, of which the following is typical:—

The London and Greenwich Railway viaduct is now fast approaching completion, and presents a very imposing appearance. It forms a highly interesting object from the summit of Nunhead Hill, at the back of Peckham, from which the whole range of arches, seen in nearly its entire length, appears like the "counterfeit presentment" of a Roman aqueduct. Nunhead Hill is decidedly the best point from which to obtain a general view of this magnificent work, which there forms a part of the foreground to an exquisite and comprehensive panorama of the metropolis, in its whole enormous length from Chelsea to Greenwich, with all its "domes and spires and pinnacles," amongst which those of Westminster Abbey and St. Paul's are of course the most conspicuous. — *From the "Mechanics' Magazine" of September* 12, 1835.

The great day was now at hand, however, when the public could experience the thrill of the railway in its primary function as a means of transport, and the impression of the range of arches as a Roman aqueduct or a series of dwelling houses fell into the background. Trial trips became the


REFERENCE:—
LONDON AND GREENWICH RAILWAY
SOUTH EASTERN RAILWAY
LONDON BRIGHTON AND SOUTH COAST RAILWAY
EAST LONDON RAILWAY
CANNON ST
CANNON STREET LINE OPENED SEPTEMBER 1, 1866
WAPPING TO SHOREDITCH OPENED APRIL 11, 1876
LONDON BRIDGE
TO CHARING CROSS
LONDON BRIDGE TO CHARING CROSS LINE OPENED JANUARY 11, 1864
OPENED DECEMBER 14, 1836
RIVER
WAPPING
ROTHERHITHE
TEMPORARY TERMINUS FROM FEBRUARY 8 TO DECEMBER 13, 1836. PERMANENT STATION OPENED FEBRUARY, 1843 CLOSED MARCH 15, 1915
SPA ROAD
NEW CROSS GATE TO WAPPING OPENED DECEMBER 6, 1869
SURREY DOCKS
THAMES
OPENED FEBRUARY 8, 1836
GRICKLAYERS ARMS
WILLOW WALK
OLD STATION CLOSED JUNE 17, 1928
SOUTH BERMONDSEY
CORBETT'S LANE JUNC.
OPENED FEBRUARY 5, 1905 CLOSED MARCH 15, 1915
SOUTHWARK PARK
BRICKLAYERS ARMS TO BRICKLAYERS ARMS JC OPENED MAY 1, 1844
COMMERCIAL ROAD
OPENED JULY, 1858 CLOSED DECEMBER 31, 1866
NORTH KENT WEST JUNCTION
SOUTH BERMONDSEY NEW STATION
CANAL
SURREY CANAL JUNCTION
NORTH KENT WEST JUNCTION TO SURREY CANAL JUNCTION OPENED SEPTEMBER 22, 1849
BRICKLAYERS ARMS JUNCTION
NORTH KENT EAST JUNCTION
GRAND
SURREY
LONDON BRIDGE TO EAST BRIXTON LINE OPENED AUGUST 13, 1866
OPENED FEBRUARY 8, 1836
TO MAZE HILL OPENED FEBRUARY 1, 1878
TO DARTFORD
DEPTFORD
OPENED DECEMBER 24, 1838
GREENWICH
OLD KENT ROAD JUNCTION
CORBETT'S LANE JUNCTION TO CROYDON OPENED JUNE 5, 1839
OLD KENT ROAD OPENED AUGUST 13, 1866 CLOSED JANUARY 1, 1917
NEW CROSS
NEW CROSS GATE
NORTH KENT EAST JUNCTION TO BLACKHEATH AND GRAVESEND OPENED JULY 30, 1849
0 1/4 1/2 3/4 1 Mile
QUEEN'S ROAD
TO PECKHAM RYE
TO CROYDON
TO ORPINGTON

Chronological plan showing the development of the London & Greenwich Railway and associated lines

order of the day, and the *Sunday Times*, of January 31, 1836, said:—

A passenger in a Greenwich railway carriage, on Monday last, says that in one of the experimental trips, the train of six carriages was conveyed at the rate of a mile per minute, or 60 miles per hour! He adds that the sensation experienced was that of flying.

That the section between Spa Road and Deptford was opened to public traffic on February 8, 1836, has been overlooked by writers more than once, doubtless in view of the later formal opening.

This railway has at length commenced running for pay, though only about 2¼ miles of the middle of it, from Deptford to Bermondsey Street, have been finished. An account of the receipts from the 8th, the day on which the running commenced, to the 19th . . . show a progressive and rapid increase. The daily average of the first week's returns was about £17; of the last nearly £31, or £11,300 per annum. — *From "The Railway Magazine" of March*, 1836.

Traffic returns for this section of the line, as recorded in *The Railway Magazine* of June, 1836, show that in February, 20,412 persons were carried, in March, 25,465, and in April, 40,492.

On the completion of the line to London Bridge station, a formal opening ceremony, worthy of the first railway in the Metropolis was arranged, and on December 14, the Lord Mayor of London, attended by the Sheriffs and Common Council, rode in the first through train to Deptford. Just over two years later, on December 24, 1838, the Deptford-Greenwich section was opened and completed the route mileage for which the company was formed. Its later history was intimately bound up with the entry into London Bridge station of other companies' trains over Greenwich metals from Corbett's Lane junction (beginning with London and Croydon Railway trains on June 5, 1839). The outcome was a lease of the London and Greenwich properties to the South Eastern Railway on February 11, 1845. This arrangement was approved by Act dated July 21 of that year, and was effective as from the previous January 1. Thereafter the London and Greenwich Railway Company ceased to be an operating concern, although it retained its separate corporate identity until it was merged into the Southern Railway under the grouping of 1923.

MECHANICAL TRACTION ON FRENCH WATERWAYS.—The joint meeting of the Institute of Transport with the British Section of the Société des Ingénieurs Civils de France, which was to have been held on January 28 and was postponed, will take place on Monday, March 2, at the Institution of Electrical Engineers, Victoria Embankment, London, W.C.2, at 5.30 for 6 p.m., when Monsieur L. P. Alvin will submit for discussion his paper on "Mechanical Traction on the French Waterways." Sir Cyril W. Hurcomb, the President of the Institute, will preside.

L.M.S.R. Chief Operating Manager's Annual Dinner

Mr. C. R. Byrom, Chief Operating Manager, presided at the annual dinner of the L.M.S.R. Chief Operating Manager's Department Headquarters Staff which was held at the Corner House, Coventry Street, London, on Monday evening. The gathering was a record one in point of numbers, and the concert following the dinner was interspersed with some brief speeches.

The dinner was attended by the Headquarters' staff of the Chief Operating Manager's Department, comprising the following sections: Motive Power; New Works; Accommodation and Private Sidings; Signalling; Accidents; Organisation and Staff; Passenger Train Services; Freight Train Services; Goods Station Working; Road Transport and Cartage; Horse; and Docks and Canals. Members of the Department present included:—

Messrs. S. B. Carter, S. H. Fisher, E. Falconer, H. W. Faircloth, E. S. Hunt, W. Land, E. Lambert, F. A. Pope, C. Parker, C. Phizackerley, H. Quiggin, L. F. Rowlandson, W. A. Sargent, L. B. Snoppee, and D. C. Urie.

The following were amongst the principal guests:—

Messrs. G. H. Loftus Allen, A. F. Bound, G. L. Darbyshire, Ashton Davies, A. Eddy, F. E. Fairburn, Capt. J. W. Harris; Messrs. J. A. Kay, E. J. H. Lemon, D. R. Lamb, H. V. Mosley, Sir Josiah Stamp; Messrs. J. Shearman, W. A. Stanier, S. J. Symes, E. Taylor, H. L. Thornhill, and W. V. Wood.

Mr. Byrom in proposing the toast of "The L.M.S.R." said that they were fortunate in having present Sir Josiah Stamp, and he felt sure all would join in giving him a most hearty welcome and in assuring him of their unswerving loyalty and support. Having regard to the many calls on their President's time, he considered it a great compliment that he had attended that evening, and he hoped he would come again in future years. It was also particularly gratifying that when he sent out personal invitations for that evening, all the Vice-Presidents and all the Chief Officers, without exception, accepted. To say he was very glad was to put it mildly. Moreover, what was more, with three exceptions, they had all turned up. He wished to compliment Mr. F. A. Pope who had organised the dinner. Last year it had been organised by Mr. S. E. Parkhouse, who had now gone to Crewe.

Proceeding, Mr. Byrom said his relations with other departments continued to be friendly. It was only by co-operation between all departments that the work of their great organisation could be carried on. Naturally they were closely associated with the Commercial Department, who provided them with the traffics they had to carry. He was particularly pleased at the presence of Mr. Ashton Davies, whom he looked upon as his partner. He much appreciated the manner in which all grades of his staff had supported him.

Sir Josiah Stamp, in responding, said he had not realised from Mr. Byrom's invitation how large and representative the gathering was to be, otherwise he might that evening have rehearsed the speech he was preparing for the annual meeting. He wished to offer them all a sincere word of congratulation for the excellent performance the Operating Department had put up, and hoped they would all remember that today's service was to-morrow's prestige.

Mr. S. H. Fisher, in proposing the toast of "Our Guests," said that the presence of the President, two Vice-Presidents, two other members of the Executive Committee and such an array of chief officers, testified to the good relationship existing between the other departments and the Operating Department, and also to the popularity of their chief, Mr. Byrom.

Mr. H. L. Thornhill, in responding, said that notwithstanding his youthful appearance he had seen over forty years' service with the L.M.S.R. and its constituent, the old L.N.W.R. He contrasted the present day operating methods with those of his early days, when nothing larger than 2-4-0 6-ft. 6-in. engines, and 5-coach trains were to be seen at Euston. The great changes in recent years were due to the dynamic energy of their President. No such changes had been brought about in any other industrial enterprise in this country. He thought that in Mr. Ashton Davies they had one of the great salesmen of the age, whilst Mr. Byrom, who had to see to the distribution of the business put in his way, had one of the most difficult tasks anyone could be asked to perform. In this work he had been most ably assisted by all grades of the operating department.

After Mr. E. E. Webb had proposed the health of the Chairman, and Mr. Byrom had responded, the proceedings terminated with "Auld Lang Syne" and the National Anthem.

SENTINEL WAGGON WORKS RECONSTRUCTION SCHEME.—The directors have issued details of the reconstruction scheme under which the business will be taken over by a new company, which will raise additional funds by the issue of £50,000 5 per cent. debentures and by making calls on shareholders to the extent of £32,500. Realisation of assets no longer required is expected to produce an additional £57,500 at least. The bank overdraft of upwards of £102,500 will be met partly from realisation of surplus assets, and as to the balance by a cash payment from the new company. Preferential creditors will be paid in full out of the assets of the present company. Unsecured creditors will receive 5s. in the £ in cash, and income notes of the nominal value of 1s. 8d. in the £, which will be redeemed out of the net profits of the new company. In the opinion of the directors, the only alternative is a forced liquidation. Meetings to consider the scheme have been convened for February 17.

RAILWAY AND OTHER MEETINGS

Bengal & North Western Railway Co. Ltd.

The ordinary general meeting of the Bengal & North Western Railway Co. Ltd. was held at Winchester House, Old Broad Street, E.C., on January 30. In the absence of Lt.-Col. Gracey, R.E., Sir Henry P. Burt, K.C.I.E., C.B.E., the former Chairman, presided.

Lt.-Col. W. R. Izat, D.S.O., the Managing Director, read the notice convening the meeting and the auditors' report.

The deputy Chairman, in moving the adoption of the report and accounts, said that, as the shareholders were aware, he had since their last general meeting resigned the chairmanship of the company, a step which he decided to take with very great regret, because he felt that the time had come when he could reasonably claim more leisure than he could hope to secure so long as he occupied the responsible position as their chairman. He had, therefore, to explain the reason why he was again taking the chair at their meeting. It was due to the fact that Lt.-Col. Gracey, R.E., who had been appointed by the board to succeed him, had been deputed to visit India on the company's business.

The deputy Chairman then proceeded with the ordinary business of the meeting. He said that the gross earnings of the joint undertaking compared with those of a year ago, had increased by over Rs. 16 lakhs. On the company's own line the gross earnings increased by Rs. 5 lakhs, and on the Tirhut line by Rs. 11 lakhs. The number of passengers carried showed a welcome improvement, having increased by 2½ millions, and the receipts therefrom by Rs. 14 lakhs. The comparison, however, made with a year when traffic was seriously interrupted by the earthquake and floods; but the results were the best the company had had since 1931.

The goods traffic was exceptionally good in the first half-year, but fell off considerably in the second half. The falling off was mainly due to traffic in food grains, principally in the rice traffic. Taking the year as a whole, there was an increase of over 329,000 in tons lifted and of nearly Rs. 2 lakhs in receipts, the totals being the highest that they had ever dealt with. So far, during the current year, the tendency continued for a steady increase in the passenger traffic and a falling off in goods traffic, with very little change in the total receipts.

Working expenses increased by Rs. 14 lakhs, almost entirely accounted for by heavier expenditure on earthquake damage, track renewals and repairs, renewal of engines and heavier repairs to vehicles. On account of the heavier engines now employed, and the wear in the 50-lb. rails now in the line, which had been in use for about 40 years, it had become necessary to make a start with relaying the main line with 60-lb. rails. This work would be carried out under a programme which must necessarily extend over several years. The increase in the weight of the engines had also made it necessary to replace most of the 20-ft. girder spans in the main line with stronger girders. The percentage of working expenses to gross earnings rose from 45·94 to 47·87, a figure which in all the circumstances of the case might be regarded as not unsatisfactory.

The company's share of the net earnings amounted to £793,900, or £11,161 more than in the preceding year, and the final amount remaining to be dealt with was £288,073, from which the board recommended payment of a final dividend of 7 per cent., together with a bonus of 1 per cent., making for the whole year a total dividend and bonus of 16 per cent., as last year. It was satisfactory that it had not been necessary to draw upon part of the interest on the company's reserves for dividend purposes.

Excellent progress had been made in repairing the damage due to the disastrous earthquake of two years ago. Although some works had still to be completed and a considerable amount of ballast was required to replace what was lost, the bulk of the work of restoration had now been completed. In addition to the total of Rs. 14,16,219 shown in the report under the heading of expenditure for this purpose, Rs. 7,93,555 had been temporarily charged to Tirhut Suspense Account up to September 30, 1935, leaving a balance of Rs. 8,38,233 on the Tirhut Railway and Rs. 15,345 on the company's lines to complete the work as estimated.

In his address two years ago the Chairman explained what the board had done to safeguard the interests of shareholders under the New Constitution for India. The Government of India Act had now been passed by both Houses of Parliament and had become law, and the safeguards which in the opinion of the Secretary of State and the representatives of the Indian Railway Companies were necessary adequately to protect shareholders' interests had been embodied in the Act. It was understood that the Government of India was greatly concerned at present about the financial position of the railways in India. The improvement in trade which raised hopes that railways would emerge from the depression of the last few years had not developed as was anticipated, and railway administrations had been urged to take stock of the situation generally with a view to securing a substantial increase in earnings and a reduction in expenditure, so as to bring about an improvement in the financial position. The Indian Railway Conference Association had the task in hand of revising the goods classification and the rating system generally, a very necessary operation, and this would certainly lead to some improvement in earnings.

In the board's opinion, however, the present time, when the improvement in trade appeared to be temporarily arrested, was not a suitable occasion for any general increase in charges, and speaking for the Bengal & North Western Railway, beset as it was by competition from road and river as well as from neighbouring railways, there was little scope for higher rates. The company's policy was to enhance, whenever possible, the rates which on account of the action taken by its competitors might have been forced down to an unnecessary low level, while avoiding doing anything in that direction which would tend to divert or discourage traffic.

It was, however, to matters beyond the control of railway administrations that attention would have to be paid if the end in view was to be reached. In particular, the deputy Chairman instanced the need for the introduction of effective legislation to control motorbus competition; the taxation of railways by municipalities, especially in cases where a tax was imposed on railway traffic which was not imposed on that using the roads; the effect of labour legislation restricting the hours of labour, the discharge of employees and disciplinary action, and the unnecessary expenditure involved by requiring the purchase of stores in India even when they could be obtained cheaper in Europe. Further, in his view, the efficiency in the working of railways was seriously impaired by the excessive concentration in the hands of the Railway Board of detailed control, and the craze for uniformity which, during more recent years, had become so pronounced a feature of its administration.

The deputy Chairman quoted from his own remarks at the company's meeting in 1931 regarding the recommendations of the Acworth Committee to the present Railway Board on the subject of decentralisation, when he gave it as his opinion that the demand for uniformity regardless of local conditions weakened the authority and initiative of the Agents and increased the cost of working, especially where the staff was concerned. The need for freeing the Agents from detailed control was also emphasised in the report of the Indian Retrenchment Committee in 1922. It was to be hoped that the powers and duties of the Statutory Railway Authority would take cognisance of this matter.

In conclusion, he expressed the appreciation of the board of the work of the staff in India, particularly of those engaged upon the restoration of earthquake damage, and of the

efficiency with which the staff of the London office had carried out their duties.

Sir Leonard L. Cohen, K.C.V.O., seconded the resolution, and the report and accounts were unanimously adopted.

The Chairman then proposed the following resolution: "That a final dividend of £7 per cent. and a bonus of £1 per cent. for the six months ended September 30, on the ordinary stock of the company, be, and the same are hereby declared, making with the ad-interim dividend of £4 per cent. paid on July 29, 1935, a total dividend of £16 per cent. for the year ended September 30, 1935."

Lord Meston, K.C.S.I., seconded, and the resolution was carried.

Sir Leonard Cohen, in proposing the re-election of Sir Henry Burt as a director of the company, added that he wished to express the regret of the board at Sir Henry's retirement from the chairmanship. Sir Henry had become Chairman in 1919, and had therefore directed the company's affairs for 16 years. Under his guidance the Bengal & North Western Railway not only enjoyed the confidence of its shareholders, but had fulfilled in ample measure the duties and responsibilities confided to it by the Secretary of State. The directors now offered him their best wishes that he might long enjoy his greater leisure.

Sir Malcolm Hogg seconded the motion, which was carried, and Sir Henry Burt replied briefly.

After the re-election of Sir Malcolm Hogg as a director, and of the auditors, a vote of thanks to the Chairman and directors, and to the staff in India and England, was moved by Miss I. F. P. Monckton, seconded by Mr. J. R. Crook, and carried amid applause. The Chairman acknowledged the vote.

G.W.R. Chief Goods Manager's Dinner

Mr. A. Maynard, Chief Goods Manager, presided at the annual dinner of the Great Western Chief Goods Manager's Office staff on Friday, January 31, at the Holborn Restaurant, when upwards of 200 members of the present and past staff and friends attended. The company included:—

Messrs. R. G. Barefoot, District Goods Manager, Bristol; D. Blee, District Goods Manager, Shrewsbury; R. Carpmael, Chief Engineer; P. E. Culverhouse, Architect; F. C. A. Coventry, Superintendent of Road Transport; C. T. Cox, Divisional Superintendent, Paddington; L. J. A. Callaway, District Goods Manager, Gloucester; S. H. Creebo, Rates Assistant to Chief Goods Manager; M. J. M. Dewar, Publicity Officer; W. Davis, District Goods Manager, Swansea; W. Elliott General Manager, Pickfords Limited; C. Furber Mineral Traffic Manager; H. T. Forth, Assistant Accountant; K. W. C. Grand, General Assistant to Superintendent of the Line; F. C. Hockridge, Assistant Surveyor and Estate Agent; H. J. Hoskins, Goods Superintendent, Paddington; J. A. Kay, Editor, THE RAILWAY GAZETTE; F. W. Lampitt, Commercial Assistant to Chief Goods Manager; J. F. Lean, Principal Assistant to General Manager; D. R. Lamb, Editor, *Modern Transport*; A. Maynard, Chief Goods Manager; G. Matthews, Operating Assistant to Superintendent of the Line; T. Martin, District Goods Manager, Liverpool; A. S. Mills, District Goods Manager, London; G. E. Orton, Commercial Assistant to Superintendent of the Line; H. W. Payne, Principal Assistant to Chief Goods Manager; P. W. Pine, Assistant Solicitor; F. R. Potter, Principal Assistant to Superintendent of the Line; A. G. Pollard, Assistant to Chief Accountant; F. H. D. Page, Signal and Telegraph Engineer; J. F. Potter, Assistant Divisional Superintendent, Paddington; A. S. Quartermaine, Assistant Chief Engineer; P. G. Robinson, Assistant Manager, Hotels and Refreshment Rooms Department; R. G. Scarsbrook, Estate Assistant; F. P. Sealey, Manager, G.W.R. Royal Hotel, Paddington; B. F. Tee, Commercial and Operating Assistant to Superintendent of Road Transport; G. J. Walker, Manager, Hotels and Refreshment Rooms Department; J. R. C. Williams, Stationmaster, Paddington; J. A. Warren-King, District Goods Manager, Worcester; J. M. Wildsmith, District Goods Manager, Newport.

The company observed a silence as a mark of respect and in memory of the passing of the late King.

Mr. A. J. Pragnell proposed the toast of the Chief Goods Manager and his staff, and spoke of the unfailing courtesy and prevision which made working with him not only a service, but a happy adventure. The toast was acclaimed with musical honours.

Mr. Maynard, in response, thanked his staff and colleagues for their willing help and team spirit during a strenuous but nevertheless a fairly satisfactory year. One point stressed in particular was that in dealing with the trading public a railwayman's line of action should be dictated by the axiom "can we say yes?" Sometimes requests were viewed from an angle which made "no" an easier answer.

One has begun to look for poetic licence and cheery quip in Mr. Payne's speeches at this function, and he did not fail, with "jewels five words long," to sketch in jocular style some interesting characteristics of the guests from other departments of the G.W.R., the railway press, and the associated cartage companies. Mr. J. F. Lean, Principal Assistant to the General Manager, replied in equally light vein on behalf of the visitors.

Mr. R. R. Gale, in proposing the toast of the retired members, paid a tribute to the memory of the late Chief Goods Manager, Mr. E. Ford, who passed over last year. He complimented the retired members on their youthful appearance. Mr. R. W. Elwell, who closed his pad but three days previously, replied on behalf of the retired members. The proceedings were interspersed with musical and humorous items by a talented septet of artistes.

The L.M.S.R. Turbine Locomotive

An unusual and interesting film was shown to a gathering of railway and other engineers at Bush House, Aldwych, London, on Thursday, January 30, by British Timken Limited. The subject of the film was the turbine locomotive of the London Midland & Scottish Railway, the first turbine-driven express locomotive to be put into regular service on British railways, and also the first British steam locomotive to be fitted with anti-friction bearings on all wheels. The engine is said to be very smooth and free running, an outstanding feature being the negligible consumption of axlebox lubricant resulting from the application of tapered roller bearings to the axles.

The commentator, Mr. J. E. Spear, Railway Engineer to British Timken Limited, referred in an opening address to previous applications of roller bearings to locomotives. The practice originated in the U.S.A., where a locomotive was so equipped by the Timken Roller Bearing Company in 1930. This locomotive recently completed approximately 280,000 miles, at which period the roller bearing axleboxes had proved entirely satisfactory, without renewal. Mr. Spear stated that there were now some forty steam locomotives in the U.S.A. fitted with Timken anti-friction bearings on all axles.

The film, which was taken at the L.M.S.R. works at Crewe, is probably the first of its kind showing the assembly of axleboxes and the wheeling of an engine. It is understood that copies will be sent to all parts of the world. Beginning with the assembly of the leading bogie axles, it shows the process of roller bearing applications to all twelve wheels of the engine, and concludes with views of the locomotive in service, as well as of many features of engineering practice on the L.M.S.R.

An outstanding feature evident in the film was the freedom of the bearings when fitted to the axles. The commentator stated that the starting resistance was about 3·5 lb. a ton, compared with 16 to 20 lb. a ton for plain bearings. Among the keenly interested audience were locomotive department officers of the L.M.S., L.N.E., G.W., and Southern Railways, the London Pasenger Transport Board, the Port of London Authority, and many engineering institutions. It is intended to make the film available to mechanical and engineering institutes in all parts of this country and abroad.

FURTHER BRITISH AIRWAYS ABSORPTION.—British Airways Limited, the combine which includes among others Hillman's and Highland Airways, is reported to be negotiating the absorption of Crilly Airways Limited, a comparatively young but nevertheless enterprising concern, flying both internal and Continental services.

NOTES AND NEWS

Whitstable Town Station : Alteration of Name.—As from February 1, the Southern Railway station Whitstable Town has been renamed Whitstable and Tankerton.

Brighter Green on the Southern.—One of the standard multiple-unit express electric sets, as used on the Brighton and Eastbourne trains of the Southern Railway, is now running painted a vivid green.

Major Stormont.—A "small" advertisement in *The Times* of Tuesday stated that Major W. Stormont, who for many years and until recently organised and conducted the official travel publicity for Italy in this country, is available for another appointment.

Institute of Transport Annual Dinner.—The Institute of Transport announces that its annual dinner, which was postponed because of the death of His late Majesty, King George V, will be held on Friday, April 3, at the Connaught Rooms, London, W.C.2.

Gale in New Zealand Derails Train.—Great damage was done in the North Island, New Zealand, particularly in the Palmerston North area, by a gale on February 2. Part of a train was derailed and a passenger was injured. Telegraph lines and trees are down, and considerable delay to traffic by rail and road has resulted.

Railway Strike in Chile.—All railways in Chile were taken over by Government as the result of a strike involving 18,000 employees which came to a head on February 3. The strike is reported to be mainly of political significance, and the Government is taking strong action. Some sabotage has already occurred to the south of Santiago, where the strike has its centre.

Institution of Locomotive Engineers Silver Jubilee Dinner.—The eighteenth annual dinner of the Institution of Locomotive Engineers will be held at the Trocadero Restaurant, Shaftesbury Avenue, W.1, on February 28, at 6.30 p.m. for 7.0 p.m. This year is the silver jubilee of the foundation of the institution. Applications for tickets (15s. exclusive of wines) should reach the secretary, at 28, Victoria Street, S.W.1, by February 17.

Railway Finance Corporation.—The list of applications for the issue by the Railway Finance Corporation of £27,000,000 of 2½ per cent. guaranteed debenture stock, 1951-52, at the price of 97 per cent., was opened and closed early on Friday morning, January 31. Dealings in the new stock began on Monday, February 3. Applicants for amounts up to £5,000 received allotment in full, and for higher amounts about 82 per cent. of the amounts applied for.

Serious Buffer-stop Collision.—An unusually disastrous buffer-stop collision occurred at about 3 a.m. last Saturday at Sagauli station on the Bengal & North Western Railway in north-western Behar. A goods train approaching the station, which is a junction, got out of control and crashed through the buffers into the station building behind them, where the station staff was at work and a number of passengers were waiting for trains. The Assistant Stationmaster and four others are known to have been killed outright, and up to the time the message was dispatched—and transmitted by Reuters—no other bodies had been recovered from the debris, but it was not known how many more may have lost their lives. Telegraphic communication was interrupted as the instruments were wrecked. The line is of metre gauge.

Fatal Accident in U.S.A.—Shortly before midnight on January 31 the William S. Porter express of the Reading Railroad from Pennsylvania to New York was derailed at a bridge over the Susquehanna River near Sunbury. The locomotive and the first two coaches fell into a canal alongside the river, and the remaining vehicles were dragged down the embankment. Four persons, including the driver and fireman, were killed and 31 injured.

Telegrams from Trains.—As from February 1, passengers on long-distance trains are able to send telegrams to any part of the United Kingdom and the Irish Free State. An arrangement has been made by the Post Office with the four main railway companies to provide restaurant car attendants, and ticket collectors on non-restaurant trains, with the necessary forms, and to give any information necessary. Telegrams handed to these officials are then passed to a postal telegraph office at the station at which the train next stops.

Further London Trolleybus Services.—On Sunday next, February 9, the London Passenger Transport Board is replacing the tram service between Crystal Palace and Croydon with trolleybuses. The new service will be linked with that already running between Croydon and Sutton (opened on December 8 last) to form a single through route from Crystal Palace to Sutton. A novel feature of the trolleybuses to work this route is a special form of automatic brake control to afford additional safety in negotiating Anerley Hill, which is the steepest hill in London so far to be traversed by trolleybuses.

Air Travel Concession to Railway Season Ticket Holders.—The British railways have decided that holders of season tickets issued by any railway company (ordinary and traders) available between any of the points covered by Railway Air Services Limited, Channel Islands Airways Limited (Jersey Airways Limited, and Guernsey Airways Limited) and the joint R.A.S./Spartan Air Lines Limited, London-Isle of Wight route, shall be allowed a rebate of 10 per cent. on the air fare for journeys within the area of availability of their rail season tickets. Holders of such season tickets should present their season tickets at the time of making their seat reservations at the appropriate railway station or office, or the offices of Imperial Airways Limited at Victoria and Croydon, and fill in a voucher obtainable at these offices, entitling them to the concession. This new arrangement operates as from February 1 on the London-Belfast-Glasgow service, and the services to and from the Channel Islands operated by Channel Island Airways Limited; it will be extended to the other routes of Railway Air Services Limited as they re-open in the spring.

Road Accidents.—The Ministry of Transport return for the week ended February 1 of persons killed or injured in road accidents is as follows. The figures in brackets are those for the corresponding period of last year :—

	Killed, including deaths resulting from previous accidents	Injured
England ...	101 (121)	2,803 (2,728)
Wales	3 (3)	100 (113)
Scotland ...	6 (16)	227 (299)
	110 (140)	3,130 (3,140)

The total fatalities for the previous week were 105, as compared with 128 for the corresponding period of last year.

G.W.R. (Ealing and Shepherd's Bush Railway Extension) Bill.—To carry out its part of the £40,000,000 London electrification scheme, the company, in this Bill is taking power to construct an extension of the Ealing and Shepherd's Bush Railway from Acton to Ruislip, and to borrow from the London Electric Finance Corporation £2,000,000 for electrification and other works in connection with that extension.

L.N.E.R. (London Transport) Bill.—This Bill proposes the construction of widenings of the London and Colchester main line and other improvements in the London area as part of the £40,000,000 scheme agreed last June between the Treasury on the one hand, and London Transport, the L.N.E.R., and the G.W.R on the other. The company takes power to borrow £10,000,000 from the London Electric Transport Finance Corporation formed in July last for the purpose of carrying out the scheme.

L.N.E.R. (General Powers) Bill.—In this Bill the company seeks power to borrow £6,000,000 from the Railway Finance Corporation in accordance with the terms of the agreement with the Treasury for the works mentioned in that agreement. These works include the following for which Parliamentary authority is necessary, namely, widenings between Ely and Newmarket and passing places on the London-York main line between Grantham and Doncaster. Power to acquire the necessary lands is also being taken, and it is proposed to relieve the company from all obligation to maintain the canal from Grantham to the Trent.

Southern Railway Bill.—No special powers are included in this Bill for the far-reaching electrification scheme of this company under the £30,000,000 programme of improvements arranged between the Government and the four

main line railways. In order to carry out its part of the programme the company proposes to borrow £6,000,000 from the Railway Finance Corporation. The Bill also proposes the discontinuance by the company and the L.M.S.R. of the maintenance of part of the Glastonbury Navigation and Canal, and to empower the company to enter into agreements with the Isle of Wight Ferry Co. Ltd. in regard to the conveyance of traffic to and from the Isle of Wight.

Progress of Railway Bills.—The House of Lords Examiners of Private Bills have certified that the Standing Orders applicable to the following Bills have been complied with: Great Western Railway (Additional Powers); Great Western Railway (Ealing and Shepherd's Bush Railway Extension); London & North Eastern Railway (General Powers); London & North Eastern Railway (London Transport); London Midland & Scottish Railway; London Passenger Transport Board; Manchester Ship Canal; Southern Railway. Two petitions have already been deposited against the Manchester Ship Canal Bill, which is originating in the House of Lords. All the railway Bills are originating in the House of Commons, and amongst the petitions deposited against them are those of the Yarmouth (Isle of Wight) Pier and Harbour Commissioners, the Isle of Wight County Council, the Dover Corporation and three others against the Southern Railway Bill; of ten petitioners against the G.W.R. (Additional Powers) Bill; of three petitioners against the G.W.R. (Ealing & Shepherds Bush Railway Extension) Bill; of the Trent Navigation Company, of owners and occupiers of land adjoining the Grantham Canal and the National Farmers Union, of the Grantham Corporation, and of twelve others against the L.N.E.R. (General Powers) Bill; of five petitioners against the L.N.E.R. (London Transport) Bill; of three petitioners against the L.M.S.R. Bill; and of 29 petitioners against the London Passenger Transport Board Bill.

British and Irish Traffic Returns

GREAT BRITAIN	Totals for 5th Week			Totals to Date		
	1936	1935	Inc. or Dec.	1936	1935	Inc. or Dec.
L.M.S.R. (6,919½ mls.)	£	£	£	£	£	£
Passenger-train traffic...	357,000	355,000	+ 2,000	1,806,000	1,792,000	+ 14,000
Merchandise, &c. ...	435,000	438,000	− 3,000	2,158,000	2,125,000	+ 33,000
Coal and coke ...	301,000	283,000	+ 18,000	1,445,000	1,333,000	+ 112,000
Goods-train traffic ...	736,000	721,000	+ 15,000	3,603,000	3,458,000	+ 145,000
Total receipts	1,093,000	1,076,000	+ 17,000	5,409,000	5,250,000	+ 159,000
L.N.E.R. (6,336 mls.)						
Passenger-train traffic...	240,000	239,000	+ 1,000	1,225,000	1,210,000	+ 15,000
Merchandise, &c. ...	312,000	303,000	+ 9,000	1,541,000	1,517,000	+ 24,000
Coal and coke ...	274,000	244,000	+ 30,000	1,315,000	1,215,000	+ 100,000
Goods-train traffic ...	586,000	547,000	+ 39,000	2,856,000	2,732,000	+ 124,000
Total receipts	826,000	786,000	+ 40,000	4,081,000	3,942,000	+ 139,000
G.W.R. (3,750¼ mls.)						
Passenger-train traffic...	155,000	149,000	+ 6,000	785,000	781,000	+ 4,000
Merchandise, &c. ...	176,000	181,000	− 5,000	867,000	872,000	− 5,000
Coal and coke ...	119,000	112,000	+ 7,000	603,000	550,000	+ 53,000
Goods-train traffic ...	295,000	293,000	+ 2,000	1,470,000	1,422,000	+ 48,000
Total receipts	450,000	442,000	+ 8,000	2,255,000	2,203,000	+ 52,000
S.R. (2,154 mls.)						
Passenger-train traffic...	242,000	227,000	+ 15,000	1,200,000	1,173,000	+ 27,000
Merchandise, &c. ...	60,000	61,000	− 1,000	273,500	283,500	− 10,000
Coal and coke ...	45,000	40,000	+ 5,000	197,500	179,500	+ 18,000
Goods-train traffic ...	105,000	101,000	+ 4,000	471,000	463,000	+ 8,000
Total receipts	347,000	328,000	+ 19,000	1,671,000	1,636,000	+ 35,000
Liverpool Overhead ... (6¼ mls.)	1,126	1,065	+ 61	5,930	5,473	+ 457
Mersey (4½ mls.) ...	4,112	4,092	+ 20	21,829	21,325	+ 504
*London Passenger Transport Board ...	549,500	508,100	+ 41,400	16,871,900	16,572,700	+ 299,200
IRELAND						
Belfast & C.D. pass. (80 mls.)	1,607	1,558	+ 49	8,627	8,851	− 224
,, ,, goods	577	484	+ 93	2,133	2,068	+ 65
,, ,, total	2,184	2,042	+ 142	10,760	10,919	− 159
†Great Northern pass. (543 mls.)	7,500	7,150	+ 350	30,400	29,250	+ 1,150
,, ,, goods	10,700	10,900	− 200	39,500	38,700	+ 800
,, ,, total	18,200	18,050	+ 150	69,900	67,950	+ 1,950
†Great Southern pass. (2,076 mls.)	26,125	24,324	+ 1,801	104,669	100,954	+ 3,715
,, ,, goods	37,699	44,696	− 6,997	170,659	183,498	− 12,839
,, ,, total	63,824	69,020	− 5,196	275,328	284,452	− 9,124

* 31st week, the receipts for which include those undertakings not absorbed by the L.P.T.B. in the corresponding period last year; last year's figures are, however, adjusted for comparative purposes
† 4th week.

British and Irish Railways Stocks and Shares

Stocks	Highest 1935	Lowest 1935	Prices Feb. 5, 1936	Rise/Fall
G.W.R.				
Cons. Ord. ...	55½	44½	53½	—
5% Con. Prefce. ...	124	108	121½	—
5% Red.Pref.(1950)	117	106¾	110½	—
4% Deb.	118½	108	115½	—
4½% Deb. ...	122	110	117½	—
4½% Deb. ...	129½	118	126½	—
5% Deb.	140¼	130	138½	+1
2½% Deb.... ...	82¼	68½	76	—
5% Rt. Charge ...	137	128	134½	—
5% Cons. Guar. ...	136¾	120½	134½	—
L.M.S.R.				
Ord.	25 5/16	16	21½	+1
4% Prefce. (1923)	58¼	43½	67½	+5
4% Prefce. ...	87½	73½	87½	—
5% Red.Pref.(1955)	107	97¾	105½	—
4% Deb.	110¼	99½	107	−½
5% Red.Deb.(1952)	119 11/16	111 5/16	117½	—
4% Guar.... ...	105⅝	95½	103*	−1½
L.N.E.R.				
5% Pref. Ord. ...	15⅞	8¼	11	—
Def. Ord.	7 9/16	4¾	5⅞	—
4% First Prefce....	74¾	48	66½	+3½
4% Second Prefce.	31⅜	16¼	24	+½
5% Red.Pref.(1955)	92¼	71	88½	+4
4% First Guar. ...	103 11/16	93	101½	—
4% Second Guar.	98¾	82½	93½	—
3% Deb.	86	75	81	−1
4% Deb.	109¼	98½	106	−½
5% Red.Deb.(1947)	118½	106½	115½	—
4½% Sinking Fund Red. Deb.	112½	108	110	—
SOUTHERN				
Pref. Ord.... ...	87½	69⅜	93	+3
Def. Ord. ...	25 13/16	16¾	24	+½
5% Prefce. ...	124	108¼	122½	—
5% Red.Pref.(1964)	117¾	109½	115½	—
5% Guar. Prefce.	136½	121½	134½	—
5% Red.Guar.Pref. (1957)	121¼	112½	117½	+1
4% Deb.... ...	116¾	107	115	—
5% Deb.	138	130¼	136½	—
4% Red. Deb. 1962–67	115	106½	115	—
BELFAST & C.D.				
Ord.	9	4	9	—
FORTH BRIDGE				
4% Deb.	111¼	104½	104½	—
4% Guar. ...	109⅞	104	104½	—
G. NORTHERN (IRELAND)				
Ord.	20	7	17	—
G. SOUTHERN (IRELAND)				
Ord.	57½	14½	40½	−½
Prefce.	50	25¼	50	—
Guar.	88¾	51¼	92	+1½
Deb.	86¼	70	90	—
L.P.T.B.				
4½% "A" ...	130	119¾	127	—
5% "A" ...	139⅝	130	136½	—
4½% "T.F.A." ...	113¾	108	110	—
5% "B" ...	131½	122¾	130½	—
"C"	109½	91	109½	+1
MERSEY				
Ord.	23⅛	9¼	25½*	−3
4% Perp. Deb. ...	100½	93½	97½	—
3% Perp. Deb. ...	75½	67	76	—
3% Perp. Prefce.	62	47¼	64½*	−2

* ex dividend

CONTRACTS AND TENDERS

The L.M.S.R. is to begin improvement schemes at Heysham involving a total expenditure of over £38,000. The improvements include modernisation of the bunkering facilities for the Irish cross-channel fleet, and provision of an up-to-date coaling plant comprising wagon tippler, elevator and overhead conveyors. No. 2 berth is to be equipped with modern cranes, the Belfast Shed extended and additional sidings put in.

Diesel Railcar for Peru

Walker Bros. (Wigan) Limited has received an order from the Peruvian Corporation for one 61-seater diesel railcar fitted with a Walker isolated and detachable diesel power bogie unit arranged for uni-directional drive and engined with a Gardner 6LW engine developing 102 b.h.p. at 1,700 r.p.m. The car is to be 50 ft. overall and will weigh approximately 15 tons 10 cwt. This car will be generally similar to those in use in Northern Ireland, and will be supplied to the inspection of Messrs. Livesey & Henderson.

Leyland Motors Limited has received the following orders from railway and railway-associated road transport operators :—

Central S.M.T. Co. Ltd., 24 oil-engined and all-steel bodied Titan vehicles.

Northern Ireland Road Transport Board, 15 oil-engined and all-steel bodied Titan vehicles, and 20 all-steel bodied Lion vehicles.

London Passenger Transport Board, 12 Cub goods vehicles.

South African Railways & Harbours Board, one Cub goods vehicle.

D. Wickham & Co. Ltd. has received an order from the South African Government Railways and Harbours Board for 30 Ford-engined gang trolleys for the 3 ft. 6 in. gauge.

The South Indian Railway Administration has placed the following orders to the inspection of Messrs. Robt. White & Partners :—

A.B.C. Coupler & Engineering Co. Ltd., 15 metre-gauge locomotive buffers, type MCA, PH.

Craven's Railway Carriage & Wagon Co. Ltd., 68 pairs of carriage and wagon wheels and axles, 5 ft. 6 in. gauge.

William Beardmore & Co. Ltd. : 166 pairs of carriage and wagon wheels and axles, metre gauge, and 90 pairs of wheels without axles, metre gauge.

J. Walsh & Co. Ltd., approximately 38 tons of mild steel galvanised corrugated sheets.

Heatly & Gresham Limited has received an order from the Indian Stores Department for one 5-ton electrically-operated transporter crane and spares at a total price of Rs. 17,180 free delivery Jamalpur.

Kitson & Co. Ltd. has received an order from the Crown Agents for the Colonies for one saturated steam boiler for a standard gauge 4-6-4 tank locomotive, Hong Kong Government Railway.

The Birmingham Railway Carriage & Wagon Co. Ltd. has received an order from the London & North Eastern Railway for a further 35 wagons for container traffic.

Tubes Limited has received orders from the Madras & Southern Mahratta Railway Administration for 1,400 steel boiler tubes and 16 steel arch tubes to be supplied to the inspection of Messrs. Rendel, Palmer & Tritton.

Tenders are invited, receivable by February 18 at 237, Gresham House, Old Broad Street, London, E.C.2, for the supply to the Bengal & North Western Railway of 525,820 dogspikes and to the Rohilkund & Kumaon Railway of 50,000 dogspikes.

The Bengal-Nagpur Railway Administration invites tenders, receivable at Gresham House, Old Broad Street, E.C.2, by February 24, for 3,000 steel carriage and wagon tyres and 5,520 steel drawbars ; and, receivable by February 25, for 250 disc-centred tyred wheels and 400 carriage and wagon axles.

The Chief Controller of Stores, Indian Stores Department (Engineering Section), New Delhi, is inquiring for tenders, receivable by February 20, for a quantity of crossings and switches required for the North Western Railway during the period March 1, 1936, to August 31, 1936.

The Chief Controller of Stores, Indian Stores Department (Engineering Section), New Delhi, invites tenders, receivable by February 27, for 400 steel superheater flue tubes and 600 steel boiler tubes.

The Chief Controller of Stores, Indian Stores Department (Engineering Section), New Delhi, invites tenders, receivable by March 3, for one 60-ton and one 8-ton overhead travelling crane required for the East Indian Railway locomotive shops at Jamalpur.

Royal Funeral Journeys on the Southern

In connection with the funeral of the late King George V, which brought most of the crowned heads of Europe, as well as numerous delegations from abroad, to London to pay their last tribute, the Southern Railway has issued an official statement, dated February 5. This points out that, with one exception, all these kings and princes, together with the President of the French Republic, arrived at Victoria station from Saturday, January 25, to Monday, January 27.

Their Royal Highnesses the Dukes of York, Gloucester, and Kent were at Victoria constantly meeting the various distinguished personages.

The following list includes four kings, one president, five princes, and thirteen parties of special delegates from various States.

The safe conveyance of these important personages to and from London involved a great amount of work at high pressure, special arrangements having to be made at very short notice in most cases and necessitating constant co-operation with the various embassies. Altogether, for the inwards and outwards journeys, 10 special trains, 7 special steamers, and 13 special coaches on the various boat trains had to be provided. Victoria station itself, so often visited by His late Majesty and his family to welcome other royalties, was suitably draped, and elaborate arrangements were made for receiving these special visitors and at the same time providing the fullest possible facilities to satisfy public interest in the circumstances. All the special arrangements were carried out without a hitch of any kind.

INWARDS

Saturday, January 25	*Steamer*	*Train*
Austrian delegation ...	Ordinary	Ordinary
Sunday, January 26		
Lithuanian delegation ...	Ordinary	Ordinary
Polish delegation ...		
H.M. the King of Bulgaria	Ordinary	Ordinary
Hungarian delegation ...		
H.R.H. the Prince Regent of Jugoslavia ...	Ordinary	Ordinary
Portuguese delegation ...		
Turkish delegation* ...		
French delegation (part)*		
Italian delegation (part)*		
Japanese delegation* ...		
Spanish delegation ...	Ordinary	Ordinary
Afghan delegation ...		
Albanian delegation* ...		
Russian delegation ...		
Monday, January 27		
H.M. the King of Roumania	Destroyer	Special
H.M. the King of Denmark	Ordinary	Special
H.R.H. the Crown Prince of Sweden	Special	
H.E. the President of the French Republic ...	Special	Special
H.M. the King of the Belgians	Special	Special
H.R.H. the Prince of Luxemburg		
H.R.H. the Crown Prince of Italy	Destroyer	Special
H.R.H. the Crown Prince of Greece	Ordinary	
Portuguese delegation ...	Ordinary	

* No prior advice of journey

OUTWARDS

Wednesday, January 29	*Steamer*	*Train*
T.R.H. Prince George and Prince Nicholas of Greece...	Ordinary	Ordinary
H.E. the President of the French Republic ...	Special	Special
H.M. the King of the Belgians	Special	Special
H.R.H. the Prince of Luxemburg		
French delegation (part)	Ordinary	Ordinary
H.R.H. the Crown Prince of Italy	Destroyer	Special
Thursday, January 30		
Spanish delegation ...	Ordinary	Special
Japanese delegation ...		
Portuguese delegation ...		
Argentine delegation* ...		
Polish delegation ...	Ordinary	Ordinary
H.M. the King of Roumania	Destroyer	Special
Friday, January 31		
H.R.H. the Crown Prince of Greece	Ordinary	Ordinary
Russian delegation ...		
Saturday, February 1		
Hungarian delegation ...	Ordinary	Ordinary
Turkish delegation ...		
Bolivian delegation ...		
Sunday, February 2		
H.M. the King of Bulgaria	Destroyer	Ordinary
Afghan delegation ...	Ordinary	
Lithuanian delegation ...	Ordinary	Ordinary
Austrian delegation ...		
Monday, February 3		
H.R.H. the Prince Regent of Jugoslavia ...	Destroyer	Ordinary

LEGAL AND OFFICIAL NOTICES

In the Court of the Railway Rates Tribunal.

Road and Rail Traffic Act, 1933. Agreed Charges.

NOTICE IS HEREBY GIVEN that Applications for the approval of Agreed Charges under the provisions of Section 37 of the Road and Rail Traffic Act, 1933, short particulars of which are set out in the Schedule hereto, have been lodged with the Railway Rates Tribunal.

The said Applications may be inspected at the Office of the Tribunal, Bush House, Aldwych, London, W.C.2, at any time during office hours and at the following places:

LONDON: Railway Clearing House, 123, Seymour Street, N.W.1.
BIRMINGHAM: District Goods Manager's Office, Snow Hill, Great Western Railway.
CARDIFF: Divisional Superintendent's Office, Great Western Railway.
EXETER: Western Divisional Superintendent's Office, Southern Railway.
LEEDS: District Goods Manager's Office, Wellington Street, London & North Eastern Railway.
LEICESTER: District Goods and Passenger Manager's Office, London Midland & Scottish Railway.
MANCHESTER: District Goods Manager's Office, Hunt's Bank, London Midland & Scottish Railway.
SOUTHAMPTON: Southern Divisional Superintendent's Office, Southampton West, Southern Railway.
YORK: Goods Manager's Office, London & North Eastern Railway.
ABERDEEN: District Goods and Passenger Manager's Office, London Midland & Scottish Railway.
EDINBURGH: District Goods and Passenger Manager's Office, Waverley Station, London & North Eastern Railway.
GLASGOW: Commercial Manager's Office, Central Station, London Midland & Scottish Railway.

A copy of each Application lodged with the Tribunal can be obtained from Mr. G. Cole Deacon, Secretary, Rates and Charges Committee, 35, Parliament Street, Westminster, London, S.W.1, price 1s., post free.

Notices of objection by any parties entitled to object to the approval of any of the said Agreed Charges must state concisely the grounds of objection and must be filed at the office of the Registrar, Bush House, Aldwych, London, W.C.2, on or before the 28th day of February, 1936, and a copy thereof on or before the same day served on or sent by registered post to Mr. G. Cole Deacon, at the above address. A separate Notice must be filed and served in respect of each Application.

Each Notice filed must be on foolscap size paper and must be stamped with an adhesive fee stamp for 2s. 6d. (which can be purchased at the office of the Tribunal only). If sent by post for filing each Notice must be accompanied by a Postal Order for 2s. 6d. payable to the Registrar when a stamp will be affixed at the office. A Notice by a Representative Body of Traders must contain a statement of the facts upon which such Body claims to represent a substantial number of traders interested in, or likely to be affected by the decision on, the application.

Five additional copies of each Notice must be lodged with the original at the office of the Registrar.

T. J. D. ATKINSON,
Registrar.

5th February, 1936.

Number of Application and Date of Lodgment	Parties to Agreement	Nature of Agreed Charge
1936. No. 74— Jan. 24, 1936	LILLEY & SKINNER, LTD., King's Cross, London, N.1, and the G.W., L. & N.E., L.M. & S. and Southern Railway Cos.	Per ton. Boots and Shoes, Boot and Shoe Accessories, Hosiery, Polishes and Advertising Matter.
1936. No. 75— Jan. 27, 1936	WM. GUNSTONE & SONS, LTD., Duke Street, Sheffield, 2, and the L. & N.E. and L.M. & S. Railway Cos.	Per ton. Biscuits, in cartons.
1936. No. 77— Jan. 31, 1936	D. C. JAMES, Stratton St. Margaret, Swindon, Wilts, and the G.W., L. & N.E., L.M. & S. and Southern Railway Cos. and L.P.T.B. *This Application, by leave granted under Rule 4, relates also to Agreed Charges with other Registered Bacon Curers in Great Britain as specified therein.*	Per Live Pig. Live Pigs consigned to Registered Bacon Curers or their Agents.
1936. No. 78— Jan. 31, 1936	EUGENE, LTD., Eugene Works, Edgware Road, Hendon, N.W.9, and the G.W., L. & N.E., L.M. & S. and Southern Railway Cos.	Per ton. Hair Drying Machinery; Hair Waving Machinery; Hair Lotions; Paper Sachets; Packing materials; Advertising matter; Returned Empties as defined in the General Classification of Merchandise returned to Suppliers, forwarded from the Trader's premises at Hendon.
1936. No. 79— Jan. 31, 1936	LISSEN, LTD., Angel Road, Edmonton, London, N.18, and the G.W., L. & N.E., L.M. & S. and Southern Railway Cos.	Per ton. Accumulators and Accumulator Parts; Dry Battery Cells; Light Aluminium Castings (not machined); Wireless Receivers and Components; Electric Lamps; Sparking Plugs; Bakelite Mouldings; Advertising Material; Returned Empties as defined in the General Classification of Merchandise returned to Suppliers.
1936. No. 80— Jan. 31, 1936	PURNELL'S FOOD PRODUCTS, LTD., 16B, Meadow Street, Bristol, and the G.W. and L.M. & S. Railway Cos.	Per ton. Preserves; Pickles and Sauces; Show Cards; Advertising Matter; Returned Empties as defined in the General Classification of Merchandise returned to Suppliers.
1936. No. 81— Jan. 31, 1936	S. SCHNEIDERS & SON, LTD., Durward Street, London, E.1, and the G.W., L. & N.E., L.M. & S. and Southern Railway Cos.	Per ton. Clothing, Returned Empties as defined in the General Classification of Merchandise returned to Suppliers.
1936. No. 82— Jan. 31, 1936	J. H. BISHOP, Haverfordwest, and the G.W. Railway Co.	Per ton. Rabbits (dead).
1936. No. 83— Jan. 31, 1936	THE CELLULAR CLOTHING CO., LTD., 72 and 73, Fore Street, London, E.C.2, and the L. & N.E. and L.M. & S. Railway Cos.	Per package. Shirts and Underwear.
1936. No. 84— Jan. 31, 1936	HOLLOWAY BROTHERS, LTD., Stroud, Glos., and the G.W. and L.M. & S. Railway Cos.	Per package. Clothing and Advertising Matter.
1936. No. 85— Jan. 31, 1936	A. KIRKPATRICK & SONS, LTD., Thornhill, Dumfriesshire, and the L. & N.E. and L.M. & S. Railway Cos.	Per ton. Bacon, Cooked and Preserved Meats, Fat, Hams, Lard, Offals, Puddings and Sausages.
1936. No. 86— Jan. 31, 1936	S. SCHNEIDERS & SON, LTD., Durward Street, London, E.1, and the G.W., L. & N.E., L.M. & S. and Southern Railway Cos.	Per package. Clothing and Advertising Matter.
1936. No. 87— Jan. 31, 1936	VITACREAM, LTD., 48, Mark Lane, London, E.C.3, and the G.W., L. & N.E., L.M. & S. and Southern Railway Cos.	Per ton. Butter Flavour, Chocolate-coverture, Egg-Whites, "Vitacream," "Vitacurd," "Vitafil," "Vitafond," "Vitag," "Vitagell," "Vitaglyce" and "Vitamel."
1936. No. 88— Jan. 31, 1936	W. G. WHITE & CO., 7, Love Lane, Wood Street, London, E.C.2, and the G.W., L. & N.E., L.M. & S. and Southern Railway Cos.	Per package. Clothing, Hosiery and Textiles.
1936. No. 89— Jan. 31, 1936	WILKINSON & WARBURTON, LTD., Caresa House, King Street, Leeds, 1, and the L. & N.E. and L.M. & S. Railway Cos.	Per package. Clothing and Textiles.
1936. No. 90— Jan. 31, 1936	CHESEBOROUGH MANUFACTURING COMPANY (CONSOLIDATED), Victoria Road, Willesden, London, N.W.10, and the G.W. and L.M. & S. Railway Cos.	Per ton. Druggists' Sundries, Hair Dressings, "Vaseline," Petroleum Jelly and "Vaseline" Preparations and Advertising Matter.
1936. No. 91— Jan. 31, 1936	HORNE BROTHERS, LTD., 90-2, Oxford Street, London, W.1, and the G.W., L.M. & S., L. & N.E. and Southern Railway Cos.	Per ton. Boots and Shoes; Clothing; Cotton; Woollen and Linen Goods; Hats; Hosiery; Advertising Matter; Returned Empties as defined in the General Classification of Merchandise returned to Suppliers.
1936. No. 92— Jan. 31, 1936	THOS. MARSHALL & SON, LTD., Wellington Bridge, Leeds, and the L. & N.E. and L.M. & S. Railway Cos.	Per ton. Iron or Steel Cisterns, Cylinders, Dustbins, Incinerators, Moulders' Boxes, Tanks, Tubs, Weather Bars and Wringer Stands.
1936. No. 93— Jan. 31, 1936	MOULDS & MOORE, LTD., Barwell, Leicester, and the L.M. & S. Railway Co.	Per ton. Boots and Shoes; Returned Empties as defined in the General Classification of Merchandise returned to Suppliers.
1936. No. 94— Jan. 31, 1936	NEWTON, CHAMBERS & CO., LTD., Thorncliffe, near Sheffield, and the L. & N.E. and L.M. & S. Railway Cos.	Per package. "Izal" Toilet Rolls.
1936. No. 95— Jan. 31, 1936	PURNELL & PANTER, LTD., 10, Houlton Street, Bristol, 2, and the G.W. and L.M. & S. Railway Cos.	Per ton. Malt Vinegar; Returned Empties as defined in the General Classification of Merchandise returned to suppliers.
1936. No. 96— Jan. 31, 1936	PURNELL & PANTER, LTD., 10, Houlton Street, Bristol, 2, and the G.W., L. & N.E., L.M. & S. and Southern Railway Cos. and L.P.T.B.	Per ton. Returned Empties as defined in the General Classification of Merchandise returned to the Trader.
1936. No. 97— Jan. 31, 1936	J. HENRY BROOKE, LTD., 19/25, Nile Street, London, N.1, and the G.W., L. & N.E., L.M. & S. and Southern Railway Cos.	Per package. Clothing.
1936. No. 98— Jan. 31, 1936	BROOK TAVERNER & CO., Northumberland Street, Huddersfield, and the L.M. & S. Railway Co.	Per package. Woollen Goods and Pattern Books.

Legal and Official Notices—*continued*

Number of Application and Date of Lodgment	Parties to Agreement	Nature of Agreed Charge
1936. No. 99—Jan. 31, 1936	COHEN & WILKS, LTD., Aquatite Mills, Derby Street, Cheetham, Manchester, and the Cheshire Lines Committee and the G.W., L. & N.E. and L.M. & S. Railway Cos.	Par package.
1936. No. 100—Jan. 31, 1936	MYERS & CO. (L. & H.), LTD., Trinity Street, Leeds, 1, and the L. & N.E. and L.M. & S. Railway Cos.	Clothing and Advertising Matter.
1936. No. 101—Jan. 31, 1936	THE NOTTS HOSIERY CO., LTD., 44 and 44a, Gutter Lane, Cheapside, London, E.C.2, and the G.W., L. & N.E., L.M. & S. and Southern Railway Cos.	Per package.
1936. No. 102—Jan. 31, 1936	T. WALL & SONS, LTD., The Friary, Acton, London, W.3, and the G.W., L. & N.E., L.M. & S. and Southern Railway Cos.	Clothing, Drapery and General Stores Wares.
1936. No. 103—Jan. 31, 1936	D. JONES, DICKINSON & CO., LTD., Dowlais, South Wales, and the G.W. and L.M. & S. Railway Cos.	Per package.
1936. No. 104—Jan. 31, 1936	KEARLEY & TONGE, LTD., Mitre Square, London, E.C.3, and the G.W. Railway Co.	Hosiery.
1936. No. 105—Jan. 31, 1936	THE PRUDENTIAL ASSURANCE CO., LTD., Holborn Bars, London, E.C.1, and the G.W., L. & N.E., L.M. & S. and Southern Railway Cos.	Per ton.
1936. No. 106—Feb. 1, 1936	I. & R. MORLEY, LTD., 18, Wood Street, London, E.C.2, and the G.W., L. & N.E., L.M. & S. and Southern Railway Cos.	Sausages, Cooked Meat, Meat Pies, Lard, Potted Meat and Pastes.
1936. No. 107—Feb. 1, 1936	THE WASHINGTON CHEMICAL CO., Branch of Turner and Newall, Ltd., Washington, Durham, and the L. & N.E. Railway Co.	Per ton.
1936. No. 108—Feb. 1, 1936	MARSHALL FABRICS, LTD., 17, Minshull Street, Manchester, and the Cheshire Lines Committee and the G.W., L. & N.E. and L.M. & S. Railway Cos.	Cake. Per package. Cooked Meats, Brawn and Sausages. Per ton. Printed Matter; Stationery; Furniture; Office Equipment and Cleaning Materials; Cigars and Cigarettes; Returned Empties as defined in the General Classification of Merchandise returned to Suppliers. Per package. Gloves, Hosiery and Textiles. Per ton. Insulating Material such as Composition, Slabs or Blocks; Asbestos and Asbestos Goods and Insulating Accessories; such as Bolts, Canvas, Cement, Paint, Pitch, Wire and Wire Netting, Magnesia calcined, carbonate or fluid. Per package. Dress Materials, Household and Soft Furnishings and Piece, Goods.

(*a*) The Bengal and North Western Railway Co. Ltd.

(*b*) The Rohilkund & Kumaon Railway Co. Ltd.

THE Directors are prepared to receive Tenders for the supply of :—
(*a*) 525,820 DOG SPIKES.
(*b*) 50,000 Ditto.
as per specification to be seen at the Company's Offices.

Tenders addressed to the undersigned, and envelope marked "Tender for Dogspikes," with name of firm tendering, to be lodged not later than Noon on the 18th day of February, 1936.

For specification a fee of 10s. will be charged which cannot, under any circumstances, be returned.

The Directors do not bind themselves to accept the lowest or any Tender.

By Order of the Board.
W. R. IZAT,
Managing Director.
Secretary.

237, Gresham House,
Old Broad Street,
London, E.C.2.
3rd February, 1936.

South Indian Railway Company Limited

THE Directors are prepared to receive tenders for the supply of :—
PRESSED STEEL SLEEPERS.

Specifications and Forms of Tender will be available at the Company's Offices, 91, Petty France, Westminster, S.W.1.

Tenders addressed to the Chairman and Directors of the South Indian Railway Company, Limited, marked "Tender for Pressed Steel Sleepers," with the name of the firm tendering, must be left with the undersigned not later than 12 NOON on Wednesday, the 26th February, 1936.

The Directors do not bind themselves to accept the lowest or any tender.

A charge, which will not be returned, will be made of £1 for each copy of the specification.

Copies of the drawings may be obtained at the Offices of the Company's Consulting Engineers, Messrs. Robert White & Partners, 3, Victoria Street, London, S.W.1.

E. A. S. BELL,
Managing Director.

91, Petty France,
Westminster, S.W.1.
5th February, 1936.

Traction

LARGE concern requires for leading position an Electrical Engineer with extensive experience in traction matters, more particularly operating conditions and motor construction. Apply giving full details, experience, training, and salary required, to Box No. 20, c/o THE RAILWAY GAZETTE, 33, Tothill Street, London, S.W.1.

THE MADRAS & SOUTHERN MAHRATTA RAILWAY COMPANY LIMITED invite Tenders for :—

COPPER RODS, TUBES AND SHEETS.

Specification and Form of Tender can be obtained at the Company's Offices, 25, Buckingham Palace Road, Westminster, London, S.W.1. Fee ONE GUINEA *which will not be returned.*

Tenders must be submitted not later than 2 o'clock p.m. on TUESDAY, 18TH FEBRUARY, 1936.

The Directors do not bind themselves to accept the lowest or any Tender and reserve to themselves the right of reducing or dividing the order.

By Order of the Board.
G. W. V. DE RHE PHILIPE,
Secretary.

REQUIRED for large European Rolling Stock Works in India, a WORKS INSPECTOR to take charge of Inspection Department. Age 25-35 years. Should have had similar experience in large modern works and be competent to undertake the inspection and testing of all materials, component parts, and complete steel carriage frames and wagons. Should have had good technical education. Five-year agreement, free passages, provident fund, free unfurnished quarters, good salary according to qualifications. Apply by letter, with copies of testimonials, stating age and whether married or single, to "TEST," c/o W. ABBOTT, LTD., 32, Eastcheap, London, E.C.3.

Bengal-Nagpur Railway Company Limited

THE Directors are prepared to receive tenders for :—
A.—3,000 Steel Carriage and Wagon Tyres.
B.—5,520 Steel Drawbars.
C.—250 Disc Centred Tyred Wheels.
D.—400 Carriage and Wagon Axles.

Specifications and forms of tender can be obtained at the Company's Offices, 132, Gresham House, Old Broad Street, London, E.C.2, on or after Friday, 7th February, 1936.

A fee of 20s. will be charged for each copy of specifications A and B and 10s. for each copy of specifications C and D, which is NOT returnable.

Tenders must be submitted not later than NOON on Monday, 24th February, 1936, for specifications A and B, Tuesday, 25th February, 1936, for specifications C and D.

The Directors do not bind themselves to accept the lowest or any tender, and reserve to themselves the right of reducing or dividing the order.

By Order of the Board.
T. R. WYNNE,
Managing Director.

PATENTS for Inventions, Trade Marks, Advice, Handbook, and consultations free. King's Patent Agency, Ltd. (B. T. King, C.I.M.E., Registered Patent Agent, G.B., U.S., and Canada), 146A, Queen Victoria Street, London, E.C.4. 49 years' references. 'Phone City 6161.

NORTHERN IRELAND TRANSPORT STOCKS.—The Northern Ireland Transport Board has issued particulars of existing issues of Northern Ireland Transport Stock, which are :—£187,228 of 4 per cent. cumulative A1 stock, 1970-1995; £205,613 of 4 per cent. cumulative A2 stock, 1970-1995; and £327,250 of B stock. These stocks were all issued at par. The A1 and A2 stocks will both be converted into A stock on July 16, 1938. The Board has already acquired the road undertakings in Northern Ireland of the Belfast Omnibus Co. Ltd., H. M. S. Catherwood Limited, L.M.S.R. (Northern Counties Committee), Great Northern Railway (Ireland), Belfast and County Down Railway, and about 61 other smaller road undertakings. The B stock already issued bears cumulative interest at the rate of 4 per cent. per annum until July 15, 1937, at 5 per cent. per annum for each subsequent year, and in respect of any year after July 15, 1938, additional interest up to 1 per cent. per annum if revenue is available. Interest on A stock is payable in priority to interest on the B, except that until July 15, 1937, interest on the A2 stock ranks behind the interest on the B. These particulars are published in compliance with Stock Exchange regulations.

MORE G.W.R. STREAMLINED RAILCAR SERVICES.—Sixteen additional passenger services, operated by the latest type of 69-seat streamlined twin 130-h.p. engined diesel railcar, have just been introduced by the G.W.R. in the Swindon, Didcot, Oxford, Princes Risboro', Witney, and Banbury area. The new car has larger and lower observation windows than its predecessors, and sliding entrance doors instead of swing doors. The G.W.R. now operates 55 streamlined railcar services daily.

Railway Share Market

Active conditions have continued in the stock and share markets, although profit-taking has been in evidence and price movements have been rather irregular this week. The stocks of the main line railways were somewhat quieter earlier in the week, largely owing to the news that further appeals may be in prospect in connection with the rating question. When the traffic figures became known on Wednesday a sharp recovery developed, and, in particular, there was a demand for the first and other preference stocks of the L. & N.E.R., the £40,000 increase in the traffic figures having created a good impression.

The L.M.S. traffic increase of £17,000 was regarded as relatively disappointing, but the preference and ordinary stocks held up quite well, it being anticipated by many market men that the forthcoming annual results will show that the company has made relatively the greatest progress of any of the railways in 1935. Great Western ordinary was moderately lower after a small improvement, although hopes persist that the dividend is likely to be maintained. Southern preferred remained prominently active and has moved up further on balance for the week, it still being thought not unlikely that the full 5 per cent. dividend on this stock will be announced on Monday. The deferred came in for profit-taking. In some quarters it is thought possible that this time next year it may be well within sight of, if not in receipt of, a dividend. London Transport "C" stock was bought on the excellent traffic increase, although the latter was due to exceptional causes.

The foreign railway market has been dull and with few exceptions the Argentine stocks weakened further, while Cordoba Central debentures were subject to profit-taking after their recent rise. Leopoldina issues were also less in evidence, as were San Paulo ordinary. Nitrate Rails and Antofagasta were relatively active. The preference stock of the latter is attracting rather more attention on the view that it appears rather moderately valued, bearing in mind the arrears of dividend carried by the price. Canadian Pacific ordinary and preference stocks were in demand at higher prices.

Traffic Table of Overseas and Foreign Railways Publishing Weekly Returns

	Railways	Miles open 1935-36	Week Ending	Traffics for Week: Total this year	Traffics for Week: Inc. or Dec. compared with 1935	No. of Weeks	Aggregate Traffics to Date: Totals: This Year	Aggregate Traffics to Date: Totals: Last Year	Aggregate Traffics to Date: Increase or Decrease	Shares or Stock	Prices: Highest 1935	Prices: Lowest 1935	Prices: Feb. 5, 1936	Yield % (See Note)
South & Central America.	Antofagasta (Chili) & Bolivia	830	2.2.36	£ 14,780	+ £ 2,110	5	£ 70,460	£ 53,720	+ £ 16,740	Ord. Stk.	23	14 15/16	25	Nil
	Argentine North Eastern	753	1.2.36	7,133	+ 176	31	243,532	226,836	+ 16,696	,,	7	4	7	Nil
	Argentine Transandine	—	—	—	—	—	—	—	—	A. Deb.	49 1/2	30	50	8
	Bolivar	174	Dec., 1935	4,700	— 1,000	52	71,300	71,400	— 100	6 p.c. Deb.	13	5	10	Nil
	Brazil	—	—	—	—	—	—	—	—	Bonds.	14	11	14	3 9/16
	Buenos Ayres & Pacific	2,806	1.2.36	94,888	+ 10,159	31	2,393,991	2,160,603	+ 233,388	Ord. Stk.	101 1/2	47 1/8	101 1/2	Nil
	Buenos Ayres Central	190	18.1.36	$107,200	+ $13,100	29	$3,454,800	$3,373,800	+ $81,000	Mt. Deb.	21	10	14 1/2	Nil
	Buenos Ayres Gt. Southern	5,085	1.2.36	148,237	— 69,371	31	3,832,686	4,066,336	— 233,650	Ord. Stk.	27	13 1/2	22 1/2	Nil
	Buenos Ayres Western	1,930	1.2.36	55,699	+ 4,402	31	1,323,181	1,312,038	+ 11,143	,,	24	10	17 1/2	Nil
	Central Argentine	3,700	1.2.36	146,657	+ 11,633	31	3,725,213	3,623,470	+ 101,743	,,	17 7/8	7	13 1/2	Nil
	Do.	—	—	—	—	—	—	—	—	Dfd.	9	3 1/4	6 1/2	Nil
	Cent. Uruguay of M. Video	273	25.1.36	13,027	+ 1,847	30	304,699	455,757	— 151,058	Ord. Stk.	8 1/2	3	7	Nil
	Do. Eastern Extn.	311	25.1.36	2,716	+ 724	30	55,429	55,127	+ 302	—	—	—	—	—
	Do. Northern Extn.	185	25.1.36	1,538	+ 423	30	39,912	29,798	+ 10,114	—	—	—	—	—
	Do. Western Extn.	211	25.1.36	1,053	+ 106	30	25,072	23,220	+ 1,852	—	—	—	—	—
	Cordoba Central	1,218	1.2.36	28,260	— 100	31	912,350	913,980	— 1,630	Ord. Inc.	4	1	3	Nil
	Costa Rica	188	Nov., 1935	13,350	— 4,170	22	68,699	81,005	— 12,306	Stk.	35	30	34	5 7/8
	Dorada	70	Dec., 1935	14,000	+ 5,900	52	144,700	120,900	+ 23,800	1 Mt. Db.	103 5/8	102 1/2	103 1/2	5 13/16
	Entre Rios	810	1.2.36	10,364	— 4,766	31	348,036	391,392	— 43,356	Ord. Stk.	15	61 2	11 1/2	Nil
	Great Western of Brazil	1,082	1.2.36	11,300	— 2,100	5	48,400	54,400	— 6,000	Ord. Sh.	1/2	5/16	5/8	Nil
	International of Cl. Amer.	794	Dec., 1935	$458,840	+ $47,975	52	$4,717,930	$4,722,778	— $4,848	—	—	—	—	—
	Interoceanic of Mexico	—	—	—	—	—	—	—	—	1st Pref.	1/2	5/32	1/2	Nil
	La Guaira & Caracas	22 1/4	Jan., 1936	4,425	+ 1,325	5	4,425	3,100	+ 1,325	Stk.	8 1/2	8	8 1/2	Nil
	Leopoldina	1,918	1.2.36	24,343	+ 4,280	5	91,877	87,499	+ 4,378	Ord. Stk.	8 1/2	2 1/2	8 1/2	Nil
	Mexican	483	31.1.36	$351,300	+ $17,800	5	$1,049,500	$1,004,900	+ $44,600	,,	1 1/2	1/4	3/4	Nil
	Midland of Uruguay	319	Dec., 1935	7,995	— 5,513	26	38,696	65,833	— 27,137	,,	1 1/2	1 1/2	1 1/2	Nil
	Nitrate	401	31.1.36	9,108	+ 3,848	5	19 059	9,960	+ 9,099	Ord. Sh.	64/-	42/-	2 3/4	Nil
	Paraguay Central	274	1.2.36	$2,102,000	+ $952,000	31	$64,497,000	$31,171,000	+ $33,326,000	Pr. Li. Stk.	80 1/2	60	76 1/2	7 13/16
	Peruvian Corporation	1,059	Jan., 1936	83,119	+ 17,810	31	537,416	436,825	+ 100,591	Pref.	105 8	67 16	111 2	Nil
	Salvador	100	25.1.36	¢35,250	— ¢3,050	30	¢482,696	¢463,952	+ ¢18,744	Pr. Li.Db.	65	61	65	7 11/16
	San Paulo	153 1/2	26.1.36	25,667	+ 6,550	4	104,354	80,342	+ 24,012	Ord. Stk.	80	35	65	3 15/16
	Taltal	164	Dec., 1935	4,055	+ 1,915	26	20,700	13,570	+ 7,130	Ord. Sh.	11 3/16	1 1/8	1 3/8	7 1/4
	United of Havana	1,353	1.2.36	29,072	— 1,128	31	498,636	520,966	— 22,330	Ord. Stk.	3 1/16	1	3	Nil
	Uruguay Northern	73	Dec., 1935	1,086	— 442	26	4,719	7,294	— 2,575	Deb. Stk.	4 1/2	2 15/16	4 1/2	Nil
Canada.	Canadian National	23,684	31.1.36	840,467	+ 2,054	5	2,548,510	2,422,057	+ 126,453	—	—	—	—	—
	Canadian Northern	—	—	—	—	—	—	—	— 4 p.c.	Perp. Dbs.	78 3/8	52 1/2	64 1/2	6 5/16
	Grand Trunk	—	—	—	—	—	—	—	—	4 p.c. Gar.	103 5/8	93	102 1/2	3 7/8
	Canadian Pacific	17,224	31.1.36	620,400	+ 114,400	5	1,864,600	1,653,400	+ 211,200	Ord. Stk.	14 1/16	8 3/4	13	Nil
India.†	Assam Bengal	1,329	10.1.36	35,167	— 3,558	41	968,202	1,098,977	— 130,775	Ord. Stk.	92 1/8	77 1/2	82 1/2	3 5/8
	Barsi Light	202	10.1.36	4,365	+ 735	41	110,212	110,512	— 300	Ord. Sh.	105	77 1/2	75 1/2	6 11/16
	Bengal & North Western	2,112	10.1.36	77,538	+ 4,669	41	699,713	698,432	+ 1,281	Ord. Stk.	30 11 1/2	291	296 1/2	5 7/8
	Bengal Dooars & Extension	161	10.1.36	3,828	— 910	41	110,057	123,870	— 13,813	,,	127 1/2	122	125 1/2	5 9/16
	Bengal-Nagpur	3,268	31.12.35	192,150	+ 8,038	39	4,739,027	4,365,353	+ 373,674	,,	105	100 5/16	101 1/2	3 15/16
	Bombay, Baroda & Cl. India	3,072	31.1.36	267,675	— 33,450	43	6,722,550	6,822,825	— 100,275	,,	115 1/4	110	110 1/2	5 7/16
	Madras & Southern Mahratta	3,230	10.1.36	156,900	+ 18,410	41	4,124,622	4,337,835	— 213,213	,,	128 1/2	113 7/8	115 1/2	7 1/4
	Rohilkund & Kumaon	572	10.1.36	17,151	+ 384	41	131,630	135,464	— 3,834	,,	294	262	292 1/2	5 7/16
	South India	2,526	10.1.36	109,091	+ 5,484	41	3,067,227	3,222,453	— 155,226	,,	119 3/4	104 1/4	105 1/2	7 1/8
Various.	Beira-Umtali	204	Nov., 1935	64,179	— 176	9	129,926	125,490	+ 4 436	—	—	—	—	—
	Bilbao River & Cantabrian	15	Jan., 1936	1,317	— 932	5	1,317	2,249	— 932	—	—	—	—	—
	Egyptian Delta	622	20.1.36	7,322	— 234	42	205,213	195,043	+ 10,170	Prf. Sh.	2	15/8	1 3/4	5 11/16
	Great Southern of Spain	104	25.1.36	1,469	— 481	4	4,677	8,699	— 4,022	Inc. Deb.	3 1/2	2	3 1/2	Nil
	Kenya & Uganda	1,625	Nov., 1935	182,196	+ 11,855	48	2,184,339	2,030,213	+ 154,126	—	—	—	—	—
	Manila	—	—	—	—	—	—	—	—	B. Deb.	48	36	50	7
	Mashonaland	913	Nov., 1935	101,719	— 13,519	9	213,702	232,511	— 18,809	1 Mg. Db.	104 1/4	100	103	4 7/8
	Midland of W. Australia	277	Dec., 1935	14,842	+ 324	26	83,624	85,948	— 2,324	Inc. Deb.	98 3/4	93	92 1/2	5 7/8
	Nigerian	1,905	14.12.35	73,308	+ 9,502	37	1,191,394	1,286,098	— 94,704	—	—	—	—	—
	Rhodesia	1,538	Nov., 1935	187,828	+ 2,351	9	390,522	375,036	+ 15,486	4 p.c. Db.	105 1/2	101	104 1/2	3 15/16
	South African	13,246	11.1.36	560,495	+ 22,032	41	23,264,468	21,034,865	+ 2,229,603	—	—	—	—	—
	Victoria	4,728	Sept., 1935	789,330	+ 82,793	13	2,238 853	2,139,677	+ 99,176	—	—	—	—	—
	Zafra & Huelva	112	Dec., 1935	10,725	+ 139	52	134,755	138,474	— 3,719	—	—	—	—	—

NOTE.—Yields are based on the approximate current prices and are within a fraction of 1/16

† Receipts are calculated @ 1s. 6d. to the rupee. § ex dividend. Salvador and Paraguay Central receipts are in currency.

The variation in Sterling value of the Argentine paper peso has lately been so great that the method of converting the Sterling weekly receipts at the par rate of exchange has proved misleading, the amount being overestimated. The statements from July 1 onwards are based on the current rates of exchange and not on the par value

Electric Railway Traction

Change-Overs of Supply Frequency

WITH the increasing number of existing electric systems which are being turned over to national supply, the changing of the converting equipment to suit another supply frequency is likely to become a common occurrence. In 1932 the supply of the Shildon-Newport line of the L.N.E.R. was turned over to the grid, and the frequency changed from 40 to 50 cycles. In this case opportunity was taken to instal a rectifier in one of the two substations in place of the previous rotary converters. At Stonebridge Park power station of the L.M.S.R. the frequency of the generators is to be changed from the present 25 cycles to 50 cycles, presumably to enable the station to be linked up with the grid. A change-over of much greater magnitude took place in 1931-33 on the Paris electrified suburban lines of the French State Railways, where the equipment of 14 substations was changed from 25 to 50 cycles in order to close down two pre-war generating stations built specially for railway purposes and take supply from the Paris network.

Electric Locomotive Riding

ALTHOUGH the normal double-bogie locomotive with its four nose-suspended traction motors is generally recognised as something less than perfection, there does not seem to have been a general outcry concerning rigid frame locomotives of high power driven through individual axle drives from motors wholly springborne. Rather has general satisfaction been expressed, except that synchronised oscillations are experienced in symmetrical wheel arrangements, such as the 2-Co-2, unless the springing arrangements of the two trucks are asymmetrical. But from North America comes news that high side thrusts and rapid wear of the rails on curves, and to a lesser extent on the straight, resulted from the use at high speed of the 90 electric locomotives of the 2-Co-2 wheel arrangement set to work on the Pennsylvania Railroad in 1932-33, and illustrated in the issue of this Supplement for November 17, 1933, page 767. This was thought to be due to the high axle load of 33·5 English tons, and trials over special lengths of track were undertaken with this class, with a 2-Do-2 locomotive which had been built for the Pennsylvania, and with a 2-Co-Co-2 locomotive having an axle load of 20·5 tons belonging to another system. One of the test tracks included a length of 165 yd. of straight track comprising 116 lb. rails laid on 249 steel sleepers through the intermediary of rollers, which offered practically no resistance to lateral movement. Each sleeper was fitted with apparatus to record the lateral displacement of the rail. The instrument comprised a horizontal head against the side of the rail which was pressed against a Brinell ball one inch in diameter. The indentation made by this ball in a gauge plate showed the lateral pressure to which the rail was subjected. Electric relays were fitted to certain sleepers to register the speed of the engine being tested.

The results of these trials, which were carried on for over a year, have never been published, but we understand that they showed the importance of keeping the axle load within present usual (not unusual) limits, even when wholly springborne motors are used. They showed, also, that a 2-Co-Co-2 locomotive was a somewhat better rider than a 2-Do-2 machine, and all the newer high-power Pennsylvania electric locomotives have been of this articulated type. Some of the 2-Co-2 engines which were incomplete at the time the trials began, were improved by transferring part of the adhesion weight to the bogies.

Merseyside Developments

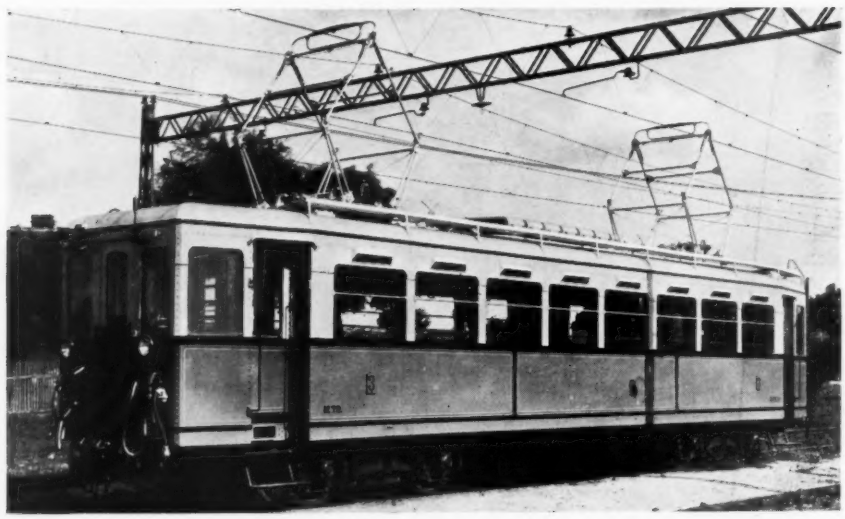
ALMOST coincident with the final decision as to which of the L.M.S.R. lines in the Wirral peninsula are to be electrified, the Mersey Railway, Britain's first conversion scheme, celebrated the Jubilee of its existence. Beginning life in 1886, it continued to operate for 17 years in a sulphurous atmosphere reminiscent of the Inner Circle at its worst. Although supplying much of what the public wanted in the way of cross-river transport, dividends were incompatible with steam traction, and so the latter had to go. With the dawn of the present century salvation came in the form of electric traction, and since May 3, 1903, the railway has been operated entirely by electricity. With the introduction of multiple-unit electric trains the traffic increased appreciably and has continued to increase ever since. For 1902, the last complete year of steam working, the passengers carried numbered 6·65 million and there was a working deficit of £4,086. By 1934 the traffic had risen to 17·5 million passengers and there was a working surplus of £90,549. The electrification was carried out by the British Westinghouse Company, the forerunners of the Metropolitan Vickers Electrical Co. Ltd., and included the erection of a steam power station at Birkenhead.

The Wirral scheme of the L.M.S.R. will join the Mersey line at Birkenhead Park, and run thence to New Brighton and West Kirby. The Seacombe branch is not to be electrified, presumably because of the small volume of passenger traffic, a volume which is hardly likely to increase whatever the method of traction, because of the roundabout route from Birkenhead and Liverpool. This electrification scheme is eminently one of those designed to develop traffic rather than to cope with existing requirements, and as there are definite limitations to the growth of Liverpool on the landward side, an increased population on the Wirral side is almost a certainty. Three-car articulated trains are to be built by the L.M.S.R. to run through from Liverpool to the Wirral termini, a duty which will be shared with the Mersey stock. A definite decision as to the type of interior has not yet been reached, but the L.M.S.R. have experience with both types, viz., open saloons on the Lancashire lines and compartment stock in the London area. Should the traffic increase to the extent anticipated, it would seem that the double track tunnel under the Mersey, with 1 in 27·30 grades at each end, must prove to be a limitation, and on the north side of the river another line from James Street station to the L.M.S.R. Exchange station is not beyond the bounds of possibility, for it would provide for the more equal distribution and collection of passengers in Liverpool and would link up with the L.M.S.R. electrified lines to Southport.

As the Mersey Railway uses a fourth rail for return current and the L.M.S.R. will use the running rails for the negative current, the stock of both companies is being fitted with change-over switches to permit of through running.

ELECTRIFIED LINES IN HUNGARY

By E. LAJTHAY, Chief of Electrification, Hungarian State Railways



Standard-gauge 1,000 volts d.c. motor-coach on Budapest suburban lines

THE earlier electrified lines of the Hungarian State Railways have become overshadowed in recent years by the Kando main-line electrification from Budapest to the Austrian frontier at Hegyeshalom,* but the technical and operating features of the lines are of interest. The pre-war electrifications are in the Budapest district and comprise a 60-miles system on the 1,000-volt d.c. principle and two lines aggregating 32 miles of the 12,000-volt single-phase type.

The Budapest local railways connect the city with the populous surrounding country. The route mileage is split up as follows between four different lines:—

	Length of Line
Budapest-Godollo; Rakospalota-Godollo ..	38·0 km.
Budapest-Dunaharaszti; Budapest-Csepel..	16·5 ,,
Budapest-Szentendre	20·0 ,,
Budapest-Nagyteteny; Budapest-Torokbalint	25·0 ,,
Total	99·5 km.

Of these, 94·5 km. are double and 5 km. single line, and there are several smaller single line branches in addition. All are of standard gauge. Electric operation on the 1,000-volt direct current system was inaugurated in the year 1911. Some tracks, common with the Budapest tramways, are worked at 600 volts d.c. Tracks common with the tramways include those from the Danube Quay (Duna to Csepel) and from Gellerth to Torokbalint, and from Rakospalota to the junction with the Budapest (Est)-Godollo line.

The railways were originally fed by three steam power-stations of their own, situated at Cinkota, Soroksar and Budafok. The electric energy for the Szentendre line was supplied by the Palffyter tramway generating station. These power-stations have now been shut down and the railways purchase electric energy from the Budapest municipal electric works. The primary current is 10,500 volts 50 cycles three-phase, and is transformed at the following substations into 1,000-1,200 volts d.c., or in some stations into 600 volts d.c.:—

BUDAFOK—
2 rotary converters of 600 kW. each.
2 motor-generator sets of 200 and 250 kW.

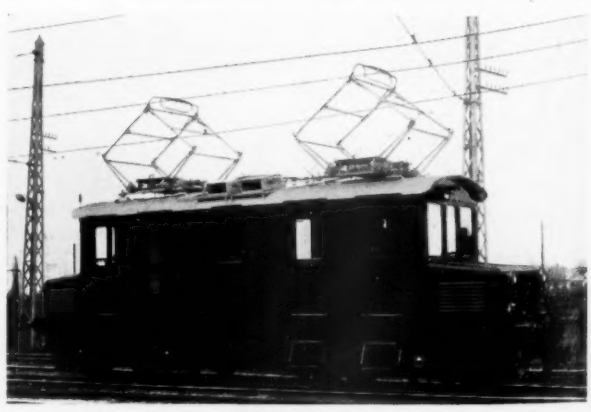
CINKOTA-NAGYITCE—
1 mercury arc rectifier, 800 kW.
2 motor-generator sets of 450 kW. each.

GODOLLO—
1 mercury arc rectifier, 500 kW.
1 motor-generator set, 450 kW.

FILATORIGAT—
1 mercury arc rectifier, 800 kW.
2 motor-generator sets, 450 kW. each.

PESTSZENTERZSEBET—
1 rotary converter, 600 kW.
2 rotary converters, 300 kW. each.
1 mercury arc rectifier, 500 kW.

The overhead conductor was one of the first catenary suspension and weight anchoring systems. The weights



440 h.p. locomotive for local traffic

* THE RAILWAY GAZETTE, July 7, 1933.

used for compensating the variations in length due to temperature change are arranged at distances of 1,000 to 1,200 m. (1,093 to 1,306 yd.). The height of the trolley above rail level varies from 4·5 to 6·2 m. (14 ft. 9 in. to 20 ft.), and the distance between poles varies, on the straight, between 45 and 50 m. (49 and 55 yd.).

The rolling stock consists of:—

Locomotives—
- 11 two-axle, with multiple-unit control .... 300 h.p.
- 10 two-axle, with hand-operated control.... 280 h.p.
- 3 four-axle, with multiple-unit control .... 440 h.p.

Motor Coaches—
- 19 two-axle, with multiple-unit control .... 210 h.p.
- 21 two-axle, ,, ,, ,, ... 150 h.p.
- 3 four-axle, ,, ,, ,, ... 440 h.p.
- 66 two-axle, with hand-operated control.... 150 h.p.
- 6 two-axle, ,, ,, ,, ... 210 h.p.

Trailers—
- 76 two-axle (multiple-unit)
- 117 ,, ,,
- 26 two-axle open (summer traffic)
- 6 four-axle (multiple-unit)
- 10 four-axle.

Both locomotives and motor coaches were built at Budapest by Ganz and have nose-suspended motors. The locomotives have a baggage compartment in the centre. The third class motor coaches have end doors and hinged platforms with side rails to permit of passage from one car to another. The bogies have outside plate frames and inverted laminated equalising springs on each side, connected to the laminated springs above the axleboxes.

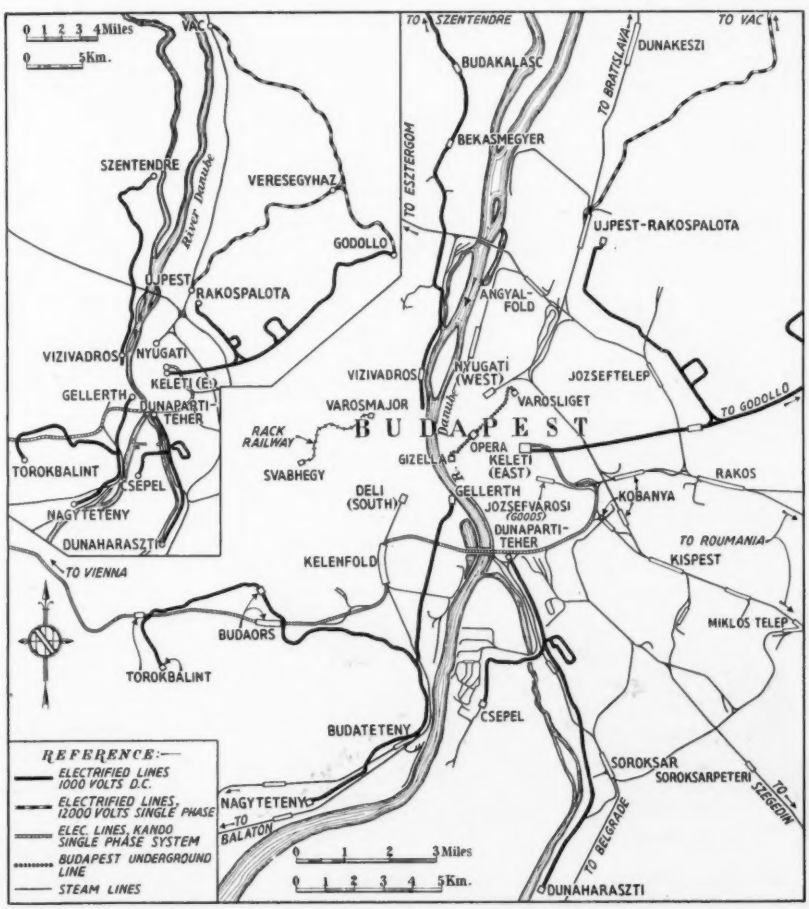
The locomotives are fitted with standard buffing and drawgear and also with a special centre coupler with side links at a low height above the rail. The motor-coaches are fitted with the second type of draw and buffing gear only.

Vac-Godollo Line

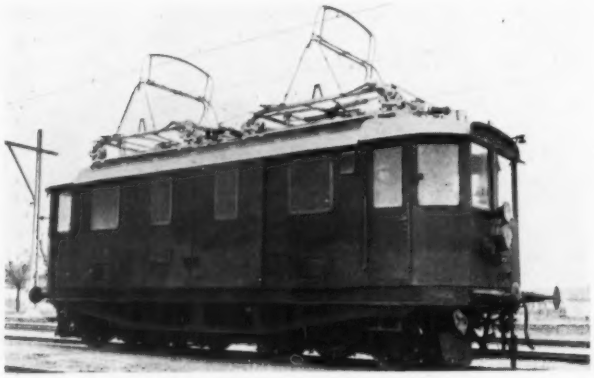
The Budapest-Vac-Godollo local electric railway, opened in 1911, can be regarded as an organic extension of the Budapest local electric system. It starts from Rakospalota-Ujpest, a suburb of Budapest; it traverses a hilly country in a north-easterly direction to Veresegyhaza, 11½ miles, where it divides, a 6½-mile branch running south to Godollo and a 13½-mile branch north to Vac, on the banks of the Danube. The line is single throughout. The total track length including station tracks amounts to 59·2 km. (36·7 miles) compared with the route mileage of 51·2 km. (31·9 miles). The steepest grade is 1 in 66, and the minimum curve 270 m. (890 ft.) radius.

The energy is supplied by the Ujpest power station of the Phoebus Electric Undertakings Co. Ltd. As long as 42-cycle energy was produced in this power station the railway was fed with 10,000 volts, 15 cycles single-phase current by means of three frequency converters of 1,000 kVA. output each. But when a change-over to 50 cycles in the power station generation was made the railway frequency was raised to 18·75 and the voltage to 12,000. The energy flows through three cables to the Rakospalota switching station and flows from here direct into the contact line and also along feeder cables to Veresegyhaza.

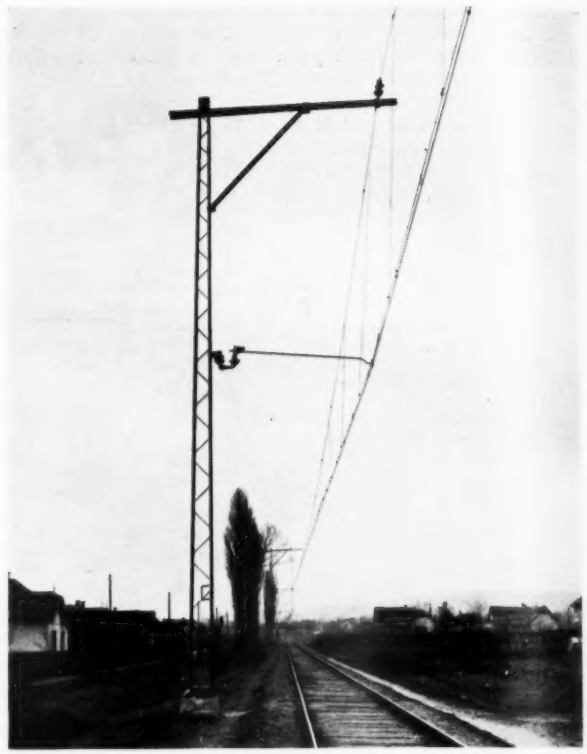
The overhead contact line is of the Siemens three-



Map of the railways in the vicinity of Budapest showing the various electrified suburban and main lines, all of which, except the Budapest underground, belong to the Hungarian State Railways



Above: Single-phase two-motor locomotive on the Vac-Godollo line, Hungarian State Railways



Right: Overhead suspension on Vac-Godollo section

conductor suspension type. The messenger cable is a 50 sq. mm. steel cable; the auxiliary supporting wire is of steel 6·5 mm. diameter, and the contact wire 70 sq. mm. grooved electrolytic copper. Its height above rail level is 5·5 m. (18 ft.). The tension of the contact wire of the catenary system is maintained and adjusted at intervals of 1·5-2·0 km. (1,640-2,200 yd.) by 400 kg. (880 lb.) weights. The distance between the steel poles carrying the catenary system amounts to 100 m. (110 yd.) on straight track and to 50 m. (55 yd.) on the sharpest curves.

The traffic is handled by means of four electric locomotives, 11 motor coaches and 18 trailers, having the characteristics shown below:—

	Locomotives.	Motor-coaches.
Type	B + B	1A + A1
Tare weight	47 tonnes	43 tonnes
Axle load	11·8 tonnes	10·6 tonnes
Maximum speed, km.p.h. ..	40 (25 m.p.h.)	50 (31 m.p.h.)
Trailing load over level track	210 tonnes	60 tonnes
Trailing load up to 1 in 66..	160 tonnes	40 tonnes
Wheel diameter, mm. ..	800 (31·5 in.)	850 (33·5 in.)
Gear ratio	1 : 3·0	1 : 4·13
Transformer capacity ..	240 kVA.	180 kVA.

The double-bogie locomotives have one motor per bogie, and this drives both axles through the medium of a jack-shaft and triangular rods. The underframe of the locomotive is of built-up steel sections, stiffened below the outside member by a light girder frame. The motor coaches have two nose-suspended motors, and both types of motive power units have two pantographs with bow collectors. Heating and lighting of the locomotives, motor coaches and trailers is effected electrically from the transformer.

Motor-coach for local traffic between Budapest, Vac, and Godollo

Main Line

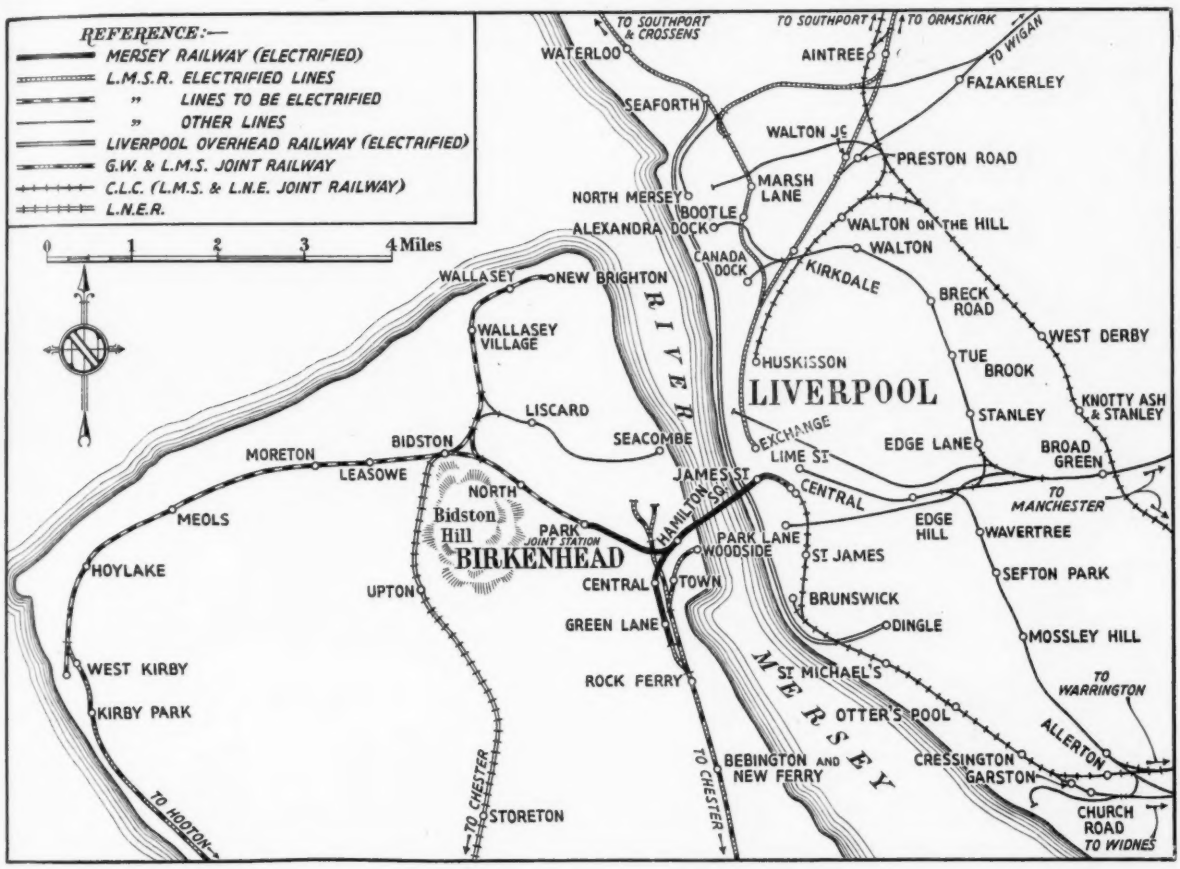
The electrification of the Budapest-Komarom section of the Budapest-Vienna main line was described in THE RAILWAY GAZETTE for July 7, 1933. In September, 1934, the remaining section on to the Austrian frontier at Hegyeshalom was completed and a partial electric service inaugurated. By the spring of 1935, when 27 locomotives were in service, all the traffic was being hauled electrically except for a few local trains. The only main line service not worked electrically is the diesel railcar which runs once a day in each direction between Budapest and Vienna. The Ganz-Metro Vick locomotives have given most satisfactory performance, and the first two locomotives built up respective mileages of 168,000 and 190,000 miles during the initial 26 months of their lives.

COMMUTATOR MILEAGE.—It has been stated recently that on certain big single-phase locomotives the commutators of the main motors have run over 190,000 miles without overhaul. This satisfactory mileage is put down to the development of a commutator with a phase-displaced auxiliary field. The ultimate life should be almost as great as that of the locomotive. Certain commutators on nose-suspended d.c. motors in this country are believed to have had a life of over 750,000 miles.

ITALIAN ELECTRIC TRAINS.—The triple-car streamlined electric trains being built for the Italian State Railways by the Soc. Italiana Ernesto Breda are almost finished, and it is expected that they will go into service between Bologna, Florence and Naples with the inauguration of the summer timetables in May.

ELECTRIFICATION OF THE WIRRAL LINES, L.M.S.R.

UNDER the Railways (Agreement) Act, 1935, the L.M.S. and Mersey Railway Companies state that the preliminary work for the establishment of a through service of electric trains between Wirral and Liverpool (Central) will shortly be put in hand. At present the L.M.S.R. lines from West Kirby and New Brighton to Birkenhead Park are steam operated, but will be electrified on the third rail system at 650 volts. All the lines of the old Wirral Railway except the Seacombe branch will be electrified. Certain alterations will be necessary to the Mersey Railway to render through electric working practicable, and it is proposed to speed up passenger progress at James Street station by replacing two of the present hydraulic lifts by four high-speed electric ones. During morning and evening rush hours there will be a 10-min. service to and from Liverpool serving the West Kirby and New Brighton sections, and also for a short period at midday, to enable the business man to lunch in comfort at home. Some of the existing stock will be used for the new services, but new vestibule stock will be built by the L.M.S.R. These are to be three-car articulated units, with first and third-class passenger accommodation. Six-car trains will be run at rush hours and holiday times. The Mersey Company's existing stock is also to be provided with heating, and with upholstered seats under the same scheme. On an average, several minutes will be saved on throughout journeys. Mersey Railway stock will be used for certain through journeys.



Sketch map of the Mersey Railway and adjacent lines, showing the L.M.S.R. section in the Wirral peninsula which is to be converted to electric traction, with through running into Liverpool over the Mersey system

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Electrical Year Book, 1936. London: Emmott & Company, "Mechanical World" Office, 28, Bedford Street, W.C.2. Manchester: 31, King Street West. 6⅜ in. by 4¼ in. 311 pp. and diary. Price 1s. 6d. net.—The traction section of this complement to the even better-known Mechanical World Year Book comprises 20 pages, and it does not appear to get put into the box marked "for future attention," for it is brought up-to-date consistently. The tables of electrified steam railways show the mileages as they were scarcely three months ago, and sundry modifications have been made in the text to bring it into line with modern practice. As a hint to the editor of what would be of use to us, and probably numerous railway electrical engineers, too, we would like to see a similar table of railways, surface and underground, which have been electrified since their inception.

ELECTRIC TRACTION AND SIGNALLING

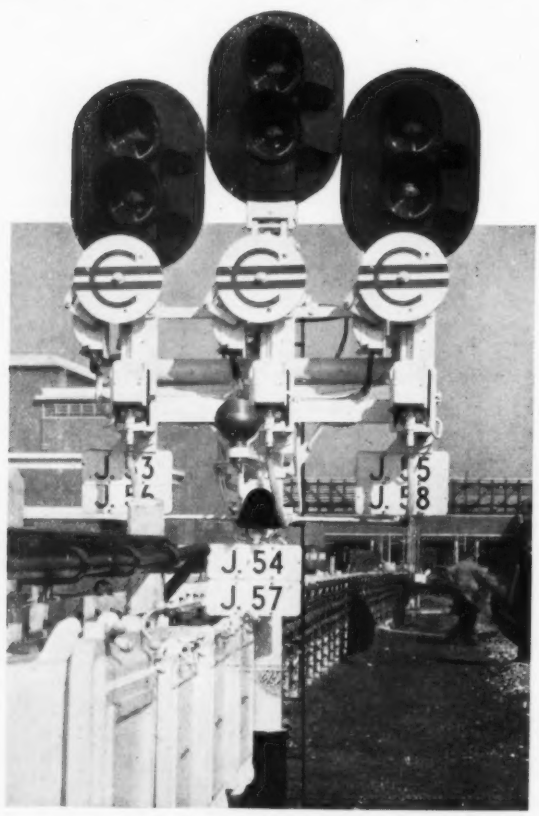
THE use of electric instead of steam traction does not in itself introduce such a change in the operating conditions of a railway as to necessitate a departure from the fundamental principles of safe working. The necessity for signalling arises primarily from two facts, viz.:—The use of a fixed track and the comparatively long braking distance required when travelling fast, due to the use of the smooth wheel and rail (the chief advantage of the railway in other respects), and to the weight carried. From these two general conditions have arisen our present interlocking and block systems which, while exhibiting various forms of construction, do not differ in their ultimate aims.

The introduction of electric traction has been accompanied by developments in signalling practice which have been directly associated with the change, especially on rapid transit lines. On main lines, where electric haulage has been adopted largely for economic reasons, the traffic as a rule has not altered to such an extent as to make the present signal systems unsuitable, but the existence of cheap electric energy has made it possible to replace mechanically worked by electric signals, an advantage in localities where heavy winter weather at times may render the regular working of mechanical apparatus a matter of some anxiety.

On single-phase railways there have been difficulties to overcome in connection with the prevention of inductive interference in block and other signalling circuits, to eliminate the possibility of false indications, but this is an engineering rather than a signalling problem and has been encountered on steam lines. The extension of heavy power mains in all directions has brought into general prominence the question of protecting low-voltage circuits from disturbance.

Where electric traction has been applied to rapid transit city and suburban lines the conditions have generally been so much altered that the signal engineer has been obliged to develop new apparatus to meet them and allow trains to run at much closer headways. The first London tubes, like the old steam Underground, were equipped with manually-worked signal apparatus, and, by means of a careful arrangement of signals and a positive last-vehicle treadle releasing the block instruments, a train could be accepted as soon as the preceding one was within the outer home signal of a station. But there were limits, both practical and economic, to such an arrangement and it was only a question of time before automatic block signals became indispensable. Although there were one or two lock-and-block systems which could be worked quite rapidly when expressly organised to that end, the Hamburg elevated having about the most complete type, a point was eventually reached where the retention of a manual system of signalling meant a reduction in the capacity of the line, and no alternative remained but to turn to automatic signals.

Colour-light signals on the Tokyo Underground



Eastbound arrival colour-light signals at Arnos Grove, on the Cockfosters extension of the London Underground

These were not a new idea when electric traction came to be applied to important lines, for steam lines in America had been fitted with them for some time, but the adoption of the track circuit on electric railways, especially where the running rails were used for the return circuit, as they usually were, offered peculiar difficulties at first, owing to the great risk of the apparatus being incorrectly influenced and even damaged by extraneous currents. Treadle contact systems therefore attracted some attention and were extensively used on the Paris Metropolitan (see THE RAILWAY GAZETTE, November 3, 1933) but it was not long before the polarised d.c. track circuit appeared in Boston and was later adopted for the electrification of the District Railway and on several tube lines of the London Electric system. A short section of automatic signals, worked by brush contact treadles, was

tried on the Central London, but it is said that the results were not encouraging. The Liverpool Overhead was fitted with Timmis' automatic signals, constructed in coöperation with Sykes, with striker bar treadle contacts, afterwards altered to contact bar working, similar to the Paris Metropolitan, and this apparatus lasted until replaced by a.c. track circuits. The Great Northern and City line, which had an insulated traction return, was fitted with ordinary d.c. track circuits, supplemented by a last-vehicle brush clearing treadle, an arrangement which has continued in satisfactory service ever since. This system was not repeated anywhere else.

The application of a.c. to track circuits by Struble in America, and the production and improvement of the impedance bond by Thullen and others, placed electric railway signalling on a new basis, upon which all the subsequent improvements have been built. These have been directed to obtaining the best train shunt effects with the minimum expenditure of power and the greatest possible immunity to interference, because even though interference may only act on the safe side the resulting delays soon cause great disorganisation in a frequent train service. The prevention of failures is therefore of prime importance. The track circuit was rapidly extended on electric lines in several countries, supplanting the old system of working. Simultaneously a careful study was made of the correct method of locating signals to conform to traffic needs, with the result that on some underground lines the maximum service which can be run on one track has by now been attained. The automatic train stop, added to this efficient signal system, has given us the highest possible degree of safety at the same time.

Somersault type of semaphore signal on the Melbourne electrified lines

The development of the light signal has been aided by the extension of electrification, the conditions on electric railways making such a signal valuable in facilitating the adoption of multiple-aspect indications, which change instantaneously and afford the driver the maximum amount of information regarding the conditions of the line ahead of him, while at the same time being comparatively easily controlled. Where overhead masts exist it is often difficult to fix semaphores so as to be clearly seen, but light signals can be accommodated in restricted clearances to give a good view.

In one respect safety has been definitely increased by the change from steam, even without any alteration in the signal apparatus. On certain main lines it has been found that the over-running of signals has been greatly diminished by the use of electric traction, where the driver is right in front looking through windows affording an unobstructed view, and has much less apparatus to handle. The absence of steam, either from one's own or other trains, contributes to this also. The provision of electric power on a large scale for the trains makes it less difficult to adopt electric signalling, the load for which is then only part of the general demand. In one or two cases, such as the Paris Metropolitan, signals have been worked direct from the third rail circuit, a system seen also for trolley contact signals on interurban lines and tramways. There is always the disadvantage with this method that power may fail, if only for a few moments, and a train may coast past some signal operating point at the same time, and unless the signal circuits are designed with great care there is a risk of the apparatus being left in an irregular condition when the power is restored, as the signals are only controlled by intermittent contact.

Automatic three-aspect signal, Piacenza-Bettola Railway

Separate power supply mains, though the power comes finally from one source, are necessary on ordinary railways so as to give the highest possible reliability, and methods of coupling to alternative supplies are desirable, as a failure of signals over an area causes great dislocation of traffic, particularly if the operation of points is affected. For this reason some engineers favour the retention of d.c. for point operation, for which accumulators can always provide power in emergencies. Standby generating sets are now often provided in signal installations to prevent a mains failure causing a total interruption in the service. These precautions are really more necessary for a steam or a mixed service than a purely electric one, since all the trains must stop in the latter case if the whole supply fails and signalling then becomes unnecessary.

NOTES AND NEWS

Norwegian Electrification Project.—The Government of Norway is at present reconsidering the proposal to expend 12,000,000 kroner (£600,000) on the electrification of the Ostfold Railway as far as the Swedish frontier.

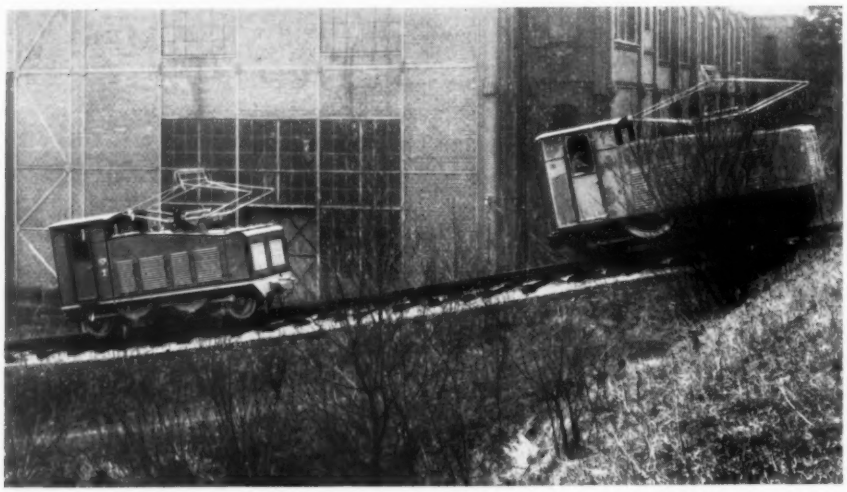
Paris Suburban Line.—The Etat line from Bois Colombes to Argenteuil, the work of conversion on which was announced in the issue of this Supplement for September 20, 1935, has been opened to electric traction. During non-peak periods there will be two direct trains an hour between Paris and Argenteuil with other services necessitating a change at Bois Colombes. At rush hours a ten-minute direct service will be given, with another six services involving a change at Le Stade.

Sydney Suburban Lines.—During the last fiscal year the New South Wales Government Railways spent £33,205 in improving the 1,500-volt d.c. Sydney electrified suburban lines, principally by extending the dead-end tunnel at St. James in order to accommodate cross-over roads for the reversal of the stock. A sum of £94,792 was expended in the maintenance of the electric equipment of the rolling stock. The electric train miles run during the year were 6,733,285 over a route mileage of 88·3.

German Electric Stock.—The electric stock of the Reichsbahn now comprises 83 locomotives of the four classes designed during the present decade; 401 locomotives of older construction; 126 motor coaches for main lines; and 918 motor coaches for the Berlin Stadt, Ring and Vorort and other local railways. The aggregate hourly rating of all these vehicles is about 1,800,000 h.p. The latest 1-Do-1 single-phase locomotives have an output of 39 h.p. per ton of weight, and the new Bo-Bo locomotives, 38 h.p.

Russian Rack Locomotives.—The Berliner Maschinenbau A.G. has built a number of electric rack locomotives for service at some of the big new peat-burning power stations erected in the U.S.S.R. Two of these locomotives are shown in the accompanying illustration. They weigh 18 tons and haul a trailing load of 42 tons up a grade of 1 in 5. Nickel-chrome steel has been used extensively in the construction of the mechanical portion. The power stations are located in areas of the U.S.S.R. which are subject to extreme variations in temperature within short periods, it being no uncommon thing for the temperature difference within three days to be 95-105° F.

Berlin-Rome by Electric ?—As a result of the editorial entitled "Long-Distance Electric Journeys," published in the January 10 issue of this Supplement, we have been reminded that about ten years ago Dr. Walter Reichel, whose article on high speed electric traction was published in our issue of May 3, 1935, prophesied that by 1937 it would be possible to travel from Berlin to Rome by electric haulage. The Nuremberg-Halle section of the Reichsbahn is now under conversion, which leaves only the Halle-Berlin section of the Reichsbahn and the Bolzano-Bologna division of the Italian State Railways to be electrified before such a journey could be made. The Italian section already is scheduled for conversion, and the Berlin end of the route will probably be put in hand when the Halle-Nuremburg line is finished. This would mean 1940 or 1941 before the conversion of the whole 1,030 miles of route from Berlin to Rome via Halle-Nuremberg-Munich-Kufstein-Innsbruck-Bolzano-Verona-Bologna-Florence. The longest electric run over this route at present is the 255 miles from Nuremberg to Brennero in a through Berlin-Rome carriage.



Two electric rack locomotives for service at large power stations in the U.S.S.R. undergoing tests at the works of the builder, the Berliner Maschinenbau A.G.

L.P.T.B. Rectifier Orders.—Amongst orders recently placed by the London Passenger Transport Board is one for an additional 1,500-kW. B.T.H. steel tank mercury arc rectifier equipment, for installation in the substation at Holloway Road. The substation was originally fitted with two similar units, supplied as part of the large contract in connection with the Piccadilly-Cockfosters extension. Three 2,000-kW. rectifiers, complete with all switchgear and control gear for a new substation at Tower Hill are nearing completion in the hands of the same company. They are to cope with increased traffic on the District and Metropolitan Railways.

More Soviet Electrification.—Railways in the U.S.S.R. which it is expected will be opened to electric traction during the course of the present year are those from Samtredi to Jugeli in the Caucasus, 38 miles, (3,000 volts d.c.); from Mineralvodskaia to Kislovodsk, 42 miles, an extension of an existing Caucasian electrification, and which was due to be turned over to electric traction more than a year ago; and the 26-mile Sagorsk-Alexandrov line in the outer suburban district of Moscow (1,500 volts d.c.).